K/EM-560

A Response to the Secretarial Initiatives on Chemical and Radiological Vulnerabilities: Year-End Progress Report

East Tennessee Technology Park

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Prepared by
Environmental Management and Enrichment Facilities
East Tennessee Technology Park
Oak Ridge, Tennessee 37831
managed by
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ACRONYMS, ABBREVIATIONS, AND INITIALISMS

AAP	Access Authorization Permit
AIP	abandoned-in-place
ASA	Auditable Safety Analysis
ASO	Analytical Services Organization
BLTR	Baseline Training Requirements
CAS	Condition Assessment System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHP	Chemical Hygiene Plan
CNF	Central Neutralization Facility
D&D	decontamination and decommissioning
DOE	U. S. Department of Energy
DOT	U. S. Department of Transportation
EH	DOE Office of Environment, Safety, and Health
EMEF	Environmental Management Enrichment Facilities
EPA	U. S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ES&H	environment, safety, and health
ESAMS	Energy Systems Action Management System
ETTP	East Tennessee Technology Park (formerly the K-25 Site)
EWP	Enhanced Work Planning
FFA	Federal Facilities Agreement
FY	fiscal year
GET	General Employee Training
HAZWOPER	Hazardous Waste Operations and Emergency Response
HMCA	hazardous materials control area
HMIS	Hazardous Materials Inventory System
HIVal	High Value Return-on-Investment
HQ	DOE Headquarters
ISMS	Integrated Safety Management System
JHA	job hazard analysis
KWTARS	K-25 Waste Tracking and Reporting System
LMES	Lockheed Martin Energy Systems
M&I	management and integration
MSDS	Material Safety Data Sheet
NEPA	National Environmental Policy Act
NMCA	Nuclear Material Control and Accountability
ORNL	Oak Ridge National Laboratory
ORO	DOE Oak Ridge Operations Office
ORPS	Occurrence Reporting and Processing System
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Act

PAAA	Price-Anderson Amendments Act
PCB	polychlorinated biphenyl
PHS	preliminary hazard screening
PPOA	Pollution Prevention Opportunity Assessment
PRF	Plutonium Reclamation Facility
PSM	Process Safety Management
PSS	Park Shift Superintendent
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Program
ROD	Record of Decision
S&M	surveillance and maintenance
S&MP	Surveillance and Maintenance Program
SAB	safety authorization basis
SHERC	Safety, Health, and Environmental Review Committee
SPE	solid phase extraction
SWPG	Safe Work Planning Group
TID	tamper indicating device
TQ	threshold quantity
TSCAI	Toxic Substances Control Act Incinerator
TSO	Technical Services Organization
USQD	Unreviewed Safety Question Determination
VPP	Voluntary Protection Program
WAC	waste acceptance criteria
WM	Waste Management
WPPIS	Work Planning and Permit Information System
WSS	Work Smart Standard

EXECUTIVE SUMMARY

On May 14, 1997, an explosion occurred in the Chemical Preparation Room of the Plutonium Reclamation Facility (PRF) at Hanford's Plutonium Finishing Plant. PRF has been shut down for several years and will be deactivated in preparation for decontamination and decommissioning. The explosion occurred in a room where nonradioactive bulk chemicals were mixed to support a now discontinued process. A spontaneous reaction of hydroxylamine-nitrate and nitric acid mixture was the cause of the explosion.

As a result of this incident, Secretary of Energy Federico Peña issued a directive to all Department of Energy (DOE) facilities on August 4, 1997, to conduct a broad initiative aimed at preventing similar occurrences at other DOE facilities. This directive contains four specific initiatives that address (1) the use, storage, and disposal of chemicals and waste; (2) known vulnerabilities; (3) the technical competence of staff; and (4) the lessons learned and occurrence reporting system.

Each of these Secretarial initiatives is addressed in this report. Evaluation criteria provided by the DOE-Oak Ridge Operations Office (ORO) were considered and very closely followed in developing the response. The approach used for the first initiative was to assess and evaluate existing management systems in use at East Tennessee Technology Park (ETTP) to handle, store, and dispose of hazardous waste and materials. To facilitate this objective, a series of facility assessments and walkdowns was performed to validate the effectiveness of the existing systems as well as identify any vulnerabilities that had not already been identified. Special emphasis was given to facilities that were in shutdown or inactive status. This evaluation found that existing management systems were functioning as intended; however, several areas for improvement were noted. In addition, uncertainties associated with long-term storage of waste, particularly characterization data for legacy waste and associated waste container storage issues, have prompted additional action items to fully understand these potential vulnerabilities.

The approach used to address the second initiative was to reevaluate the corrective action status of vulnerabilities identified in previous assessments. Examples of assessments reviewed included the Highly Enriched Uranium Vulnerability Assessment, the Chemical Vulnerability Assessment, the self-assessment conducted as a result of the TOMSK chemical accident in the former Soviet Union, and Defense Nuclear Facilities Safety Board recommendations. Most corrective actions were found to be completed, and open corrective actions for significant vulnerabilities were found to be progressing on schedule. Two notable examples include off-site shipment and sale of large quantities of lithium hydroxide and the corrective actions being taken to minimize risks associated with the storage of depleted uranium hexafluoride cylinders. The systems used to prevent and identify new vulnerabilities relative to chemical and radiological safety are numerous and are closely related to the principles and functions of an integrated safety management system.

As requested by DOE-ORO, the response to the third and forth initiatives were combined for the three main Environmental Management and Enrichment Facilities business unit facilities (ETTP; Paducah, and Portsmouth) because the processes used at each of these facilities are very similar. Teams of subject matter experts from each of the sites and the central organizations worked

together to provide program descriptions and assess site and company-level training, lessons learned, and occurrence reporting systems. The technical competence of the staff to identify and respond to chemical and radiological vulnerabilities is ensured through numerous general employee, job-specific, and facility-specific training programs. The occurrence reporting and lessons learned programs at each site ensure that potential vulnerabilities and lessons learned are shared with other organizations within Lockheed Martin Energy Systems and DOE. Improvements are being made to the Lessons Learned Program based on weaknesses identified in recent Type A and B investigations at ETTP and the Paducah site, respectively.

1. INTRODUCTION

1.1 PURPOSE OF REPORT

On May 14, 1997, an explosion occurred in the Chemical Preparation Room of the Plutonium Reclamation Facility (PRF) at Hanford's Plutonium Finishing Plant. PRF has been shut down for several years and will be deactivated in preparation for decontamination and decommissioning. The explosion occurred in a room where non-radioactive bulk chemicals were mixed to support a now discontinued process. A spontaneous reaction of hydroxylamine-nitrate and nitric acid mixture was the cause of the explosion.

As a result of this incident, Secretary of Energy Federico Peña issued a directive to all Department of Energy (DOE) facilities on August 4, 1997, to conduct a broad initiative aimed at preventing similar occurrences at other DOE facilities. This directive contains four specific initiatives.

- *DOE site contractors must scrutinize their use or storage of any chemicals that have the potential for explosion, fire, or significant toxic release, and must promptly dispose of unneeded chemicals in accordance with safety requirements and environmental regulations. DOE field offices should develop an approval process to assure the disposal or safe and environmentally compliant storage and handling of such chemicals that are retained.*

- *DOE field offices must reassess known vulnerabilities (chemical and radiological) at facilities that have been shutdown, are in standby, are being deactivated, or have otherwise changed their conventional mode of operation in the last several years, and report status to their Program Secretarial Officers and Assistant Secretary for Environment, Safety, and Health within 120 days. Facility operators must evaluate their facilities and operations for new vulnerabilities on a continuing basis.*

- *DOE and contractor field organizations with operational responsibilities must assess the technical competence of their staffs to recognize the full range of hazards presented by the materials in their facilities, act on results, and implement training programs where needed.*

- *DOE field offices must assess their site lessons learned and occurrence reporting programs to assure that (1) outgoing information is well characterized and properly summarized, and (2) incoming information is thoroughly evaluated, properly disseminated, appropriately implemented, and tracked through formal management systems.*

The purpose of this report is to document how East Tennessee Technology Park (ETTP) addressed each of these four initiatives. As requested by DOE-Oak Ridge Operations Office (ORO), this report also addressed the third and forth initiatives for Environmental Management and Enrichment Facility (EMEF) operations at Paducah and Portsmouth. Separate reports are

submitted for Paducah and Portsmouth for the first two initiatives. Environmental Management facilities located at the Y-12 Plant and Oak Ridge National Laboratory (ORNL) are addressed in reports for those sites.

1.2 SITE DESCRIPTION

1.2.1 History of ETTP

Lockheed Martin is the managing contractor for ETTP (the former K-25 Site) and DOE's two other facilities in the 37,000-acre Oak Ridge Reservation (ORR): the Y-12 Plant and ORNL. About 3,000 people work at ETTP; about 11,000 work at the other two sites.

The former K-25 Site and ORR were developed as part of the Manhattan Project, the government's secret plan to develop the first atomic bomb. Built to produce enriched uranium-235 by the gaseous diffusion process, and formerly known as the Oak Ridge Gaseous Diffusion Plant, the K-25 Site is located in what used to be the farming community of Wheat. In 1942, the land was legally acquired and construction began. The gaseous diffusion process was in operation before the end of World War II.

Until 1985, the K-25 Site continued to enrich uranium for defense purposes and for power reactors. In 1985, the site's gaseous diffusion facilities were put on standby because of the declining demand for enriched uranium, and, in 1987, gaseous diffusion operations were permanently shut down at the site.

1.2.2 Present Mission

The mission of ETTP is to reindustrialize and reuse the assets (i.e., facilities, equipment, materials, utilities, and trained work force) of the shut-down gaseous diffusion plant. This mission will be accomplished by leasing vacated facilities and forming partnerships with commercial industrial organizations in the ongoing environmental restoration, decontamination and decommissioning (D&D), waste treatment and disposal, and diffusion technology development activities at the site. ETTP serves as the base of operations for environmental management and diffusion technology development at DOE-ORO facilities. Specifically, these activities include management of the Toxic Substances Control Act Incinerator (TSCAI) located at ETTP, which is the only facility in the United States capable of incinerating certain radioactive and hazardous wastes within permitted air emission requirements; support of risk-based environmental cleanup programs for contaminated facilities and natural resources at DOE facilities in Oak Ridge and in Paducah and Portsmouth; treatment, storage, and disposal of hazardous and radioactive wastes; support of the Hazardous Waste Remedial Actions Program; and cost-effective support services for ETTP users.

2. INTEGRATED SAFETY MANAGEMENT SYSTEM AND WORK PLANNING

2.1 INTEGRATED SAFETY MANAGEMENT AT ETTP

Implementation of the Integrated Safety Management System (ISMS) at ETTP is in accordance with the plans for the EMEF business unit. The draft EMEF ISMS description was submitted to DOE on October 31, 1997. The EMEF ISMS is based on the seven guiding principles and five core functions contained in DOE Policy 450.4, *Safety Management System Policy*. It also includes principles from the Work Smart Standards (WSSs) and Enhanced Work Planning (EWP) initiatives. The EMEF ISMS description includes the expectations of a mature system. Successful deployment of the EMEF ISMS is full integration of these requirements into a standard, business unit-wide process for planning, endorsing, executing, and closing out all work performed. The process EMEF has adopted to lead this integration initiative is the Project Delivery System. The requirements of ISMS have been incorporated into the Project Delivery System, and it is currently being implemented across the business unit. The EMEF ISMS incorporates a tailored approach to work planned at all levels.

The EMEF ISMS also integrates many current initiatives, such as EWP, WSS, the Voluntary Protection Program (VPP), and the I Care—We Care Program. The EMEF ISMS description reflects the mature system to be fully implemented to ensure the protection of the workers, the public, and the environment in a more effective, fully integrated manner.

The overall framework for the EMEF ISMS is organized around the following five core functions.

1. Define the Scope of Work

Defining the scope of work consists of translating the mission objectives into a definition of work that will meet those objectives, identifying expectations for the performance of work, and allocating resources to ensure that work is performed safely. Strategic direction is defined through a formal and rigorous process by DOE and contractor senior management and staff. Missions are separated into projects for each site-specific remediation or facility operation. These projects are further divided into tasks or activities.

2. Identify and Analyze the Hazards

Analyzing the hazards associated with the planned work activities involves identifying and analyzing the hazards and risks to workers, the public, and the environment. Hazard identification and analysis are performed by teams that may include workers, supervisors, subject matter experts, and analysts. EWP as well as the numerous systems discussed in Sects. 3 and 4.2 are used to identify and analyze hazards.

3. Develop and Implement Hazard Controls

Developing and implementing hazard controls includes identifying standards and requirements, identifying and establishing hazard controls, and implementing the controls. EMEF uses standards to set environment, safety, and health (ES&H) requirements. Standards are selected using the WSS process, as defined in DOE Manual (DOE M) 450.3-1, *The Department of Energy Closure Process for Necessary and Sufficient Sets of Standards*. Teams of Lockheed Martin Energy Systems (LMES) personnel collected hazard data from EMEF planned work. These teams used the WSS process described in DOE P 450.3 and DOE M 450.3 to select the standards for protecting the workers, the public, and the environment. The teams include front-line workers, line managers, and subject matter technical experts. The selected WSS were reviewed and approved by top LMES management and DOE, and were incorporated into the contract between DOE and LMES. LMES- and EMEF-level health and safety policies, procedures, and programs are to be based on approved WSS and are discussed in detail in Sects. 3, 5, and 6.

4. Perform Work

Performing work includes adequately preparing for work, confirming readiness, performing work safely, and establishing performance measures. Specific mechanisms are selected using a tailored approach. ES&H controls are implemented through the task-level work control process. EMEF uses numerous mechanisms to communicate work requirements and ES&H controls to the work team. Many of these mechanisms, such as those related to chemical and radiological safety, are addressed in Sect. 3 of this report.

5. Provide Feedback and Continuous Improvement

Providing feedback and continuous improvement includes collecting feedback information; identifying improvement opportunities; and making changes to improve performance, oversight, and enforcement. EMEF changes processes and revises support to task supervisors to improve performance. These changes are controlled and tracked through issues management action plans. Feedback is captured through multiple mechanisms as described in Sect. 4.2.

2.2 ENHANCED WORK PLANNING PROCESS

The EWP process was used to improve the ETTP site's work control process. As a result of this process, which is used by a multi-disciplinary team from all organizations on site, one work control system is being deployed for use by all LMES factions to perform an initial hazard assessment or screening for all work being performed. This action provides the planner of the work the necessary guidance to determine the level of planning needed based on the hazards and complexity associated with performing a particular task. All hazards (including chemical-related hazards) are assessed when planning the task. Depending on the task and the results of the initial hazard screening, a team of subject matter experts from any ES&H discipline can be assembled to assist in the planning effort to assure that all hazards are properly addressed. Though not a formal job hazard analysis (JHA) process, the initial hazard screening process can lead to a formal JHA if the results of the screening show that a formal JHA is warranted. This automated work control system is located in the Work Planning and Permit Information System (WPPIS)

system, which provides links to most other pertinent databases that are needed to properly plan a task or activity.

2.3 WORK PLANNING AND PERMIT INFORMATION SYSTEM

The ETTP EWP process is supported by the new WPPIS, which is being tested in Waste Operations. WPPIS provides an easily accessible, documented, cost-effective method to develop a project or task work package that identifies and documents required or applicable ES&H requirements, including personnel protective equipment and associated permits.

WPPIS provides hazard screening checklists. Use of these checklists assists in identification of hazards, safety disciplines that will be affected, and related protective controls. It also provides a mechanism to capture and document, within each work package: (1) recommendations and instructions from subject matter experts, (2) lessons learned that are identified by a computer link to the lessons-learned database, and (3) suggestions contributed by workers as work proceeds. This tool can be used effectively during the conceptual planning phase, when a work request has been initiated, or by operations planners directing work that is not controlled by a procedure. Once the work package is prepared, computer links also provide for review and comment on the work package and listing on the approved work list for the site as well as alerting the facility operator.

2.4 SAFE WORK PLANNING GROUP

The Safe Work Planning Group (SWPG) has been established to monitor work planning at ETTP. SWPG is made up of representatives of management, the bargaining units, and ES&H professionals. The adequacy of work planning is monitored daily by SWPG, which performs selected and random reviews of work plans. Other items include operations and continuing activities. The objective of the reviews is to assess the adequacy of the work plans in identifying hazards or vulnerabilities and adequacy in control and mitigation of the hazards for worker safety. If work planning is not found adequate to support safe conduct of the work, the work is stopped until planning is completed. These reviews provide ETTP management with additional assurance that work planning is adequate for worker safety and health.

3. USE, STORAGE, AND DISPOSAL OF CHEMICALS AND WASTE

This chapter responds to the first initiative addressed in the August 4, 1997, directive from Secretary Federico Peña, which reads as follows:

> *DOE site contractors must scrutinize their use or storage of any chemicals that have the potential for explosion, fire, or significant toxic release, and must promptly dispose of unneeded chemicals in accordance with safety requirements and environmental regulations. DOE field offices should develop an approval process to assure the disposal or safe and environmentally compliant storage and handling of such chemicals that are retained.*

3.1 WASTE STORAGE AND DISPOSAL PROGRAM

3.1.1 System Overview

The handling and safe and environmentally compliant storage and disposal of hazardous chemicals and waste is conducted in accordance with numerous procedures maintained by LMES, ETTP, and Waste Management (WM) organizations. A summary of the LMES and ETTP procedures relative to waste storage and disposal is found in Appendix A. The procedures are based on applicable and relevant requirements found in 40 CFR, Protection of the Environment; Chapter 1200-11-1, Hazardous Waste Management, promulgated by the Tennessee Department of Environment and Conservation; and 49 CFR, Transportation. In addition to conducting operations in accordance with federal, state, and local requirements, ETTP has implemented Best Management Practices that go above and beyond regulatory requirements.

The process of handling and the safe and environmentally compliant storage and disposal of hazardous chemicals and waste begins with a request for disposal from a generator. WM personnel coordinate with generators to confirm the identity of the materials they will be receiving and prepare to receive the waste into inventory in a manner that meets all compliance-related requirements. Chemical compatibility assurance begins at the time the generator initially requests disposal. Once a waste is found to meet the waste acceptance criteria (WAC) for the receiving facility and is received into inventory, it is actively managed through frequent inspections. Immediate correction actions are taken for all off-normal conditions. Disposal of the waste material occurs only after the chemical composition is confirmed and an appropriate disposal outlet is available. The readiness of off-site disposal facilities is rigorously monitored.

3.1.2 Waste Tracking System

Once a waste shipment is received and WM personnel have ensured the waste shipment meets the WAC, WM determines the appropriate disposition of the waste items. Emphasis is placed on the shipment of waste to the appropriate treatment, storage, and disposition facility. In the interim, waste may be shipped to a permitted storage facility at ETTP. WM personnel use the Job Order System to authorize activities relating to the management of waste, such as picking up or receiving waste containers, moving containers, sampling or performing a nondestructive assay on

containers, recontainerizing, loading containers for shipment to an off-site treatment disposal unit, etc. Prior to scheduling a waste item to be moved, WM personnel ensure that all on-site transfers are conducted in accordance with the requirements specified in Resource Conservation and Recovery Act (RCRA) permits and facility-specific authorization basis documents.

WM personnel are also responsible for the operation and maintenance of the K-25 Waste Tracking and Reporting System (KWTARS), the waste information and reporting system used at ETTP. Data regarding a waste item (e.g., request for disposal number, container bar code, container description, storage location, etc.) is entered into KWTARS by a controlled set of personnel. This information system allows for the generation of regulatory-required reports and other performance indicator reports as specified by the users. KWTARS is the official data system for waste information at ETTP. Implementation of a new waste tracking system, Waste Information and Tracking System, is scheduled for this calendar year.

3.1.3 Waste Management Facility Practices

ETTP's three major waste management facilities include waste storage units, the Central Neutralization Facility (CNF), and the TSCAI Facility. These facilities operate in accordance with LMES, ETTP, and facility-specific policies, procedures, and programs. The Facility Safety Program provides the focal point for analyzing the hazards and identifying all the controls and design features in place to prevent or mitigate the consequences of an accident. These results are documented in facility-specific authorization basis documents. The ETTP waste storage units, CNF, and TSCAI each have unique hazards regarding their respective operations. Through the Facility Safety Program, a preliminary hazard screening (PHS) has been performed to identify the types of hazards that may be encountered during work activities at each facility. The PHS process incorporates screening criteria to separate standard industrial or occupational hazards from radiological hazards and hazards due to dangerous materials or energy sources. If warranted, additional hazard analysis may be required to evaluate accident consequences and establish controls to prevent or mitigate the effects of an accident. Standard requirements that have been established to protect the worker and the environment are identified in RCRA permits, national fire protection codes, CFR requirements, and Occupational Safety and Health Act (OSHA) requirements to name a few. The Facility Safety Program also includes these requirements in facility-specific authorization basis documents. Appendix B provides additional information on waste management facility practices, including examples of safety envelope controls.

3.1.3.1 Waste storage tanks—level controls

Waste Management storage tanks contain level indicators that provide information to operators who inspect the tanks daily. Tank level change discrepancies, which have occurred in the past, have been attributed to equipment failure. Tank level changes may occur if a level indicator probe becomes dirty and may result in an improper reading or incorrect recording of a tank level reading by an operator. If an instrumentation problem exists, instrument mechanics are called in to troubleshoot, repair, and recalibrate the instrument, and appropriate administrative controls are put in place until the problem is resolved. Manual measurements are taken by using a dipstick when the tank level gauges appear to be inoperable or malfunctioning. Volume readings are logged in the operating log. Any unusual change in level is reported to the supervisor for

corrective action. Appendix B provides additional information on tank level controls used at CNF and TSCAI.

3.1.3.2 Waste acceptance and material compatibility

Waste accepted for storage at ETTP must meet ES/WM-10 Rev. 2, *Waste Acceptance Criteria for the Oak Ridge Reservation*. The ETTP Operations Division accepts and manages waste according to a variety of specific procedures including (1) WCD-AP-1501, *Waste Acceptance, Dispositioning, and Tracking*, Rev. 2, Change 1; and (2) WTSO-AP-1501, *Preparing for a Waste Transportation and Storage Operation*. A waste acceptance plan and facility safety documentation [e.g., Auditable Safety Analysis (ASA), unreviewed safety question determinations (USQDs), etc.] are used to obtain the information necessary to store the wastes safely in containers or storage tanks, to blend them safely, and to incinerate them in accordance with the RCRA and TSCA regulations.

Before waste is accepted at TSCAI, characterization data for the waste is evaluated to ensure that it meets the WAC established in TSCA-WCS-RQT-2003. The TSCAI Blend Master reviews characterization data and ensures that there are no compatibility problems before the new waste stream is mixed with the an existing waste stream. Waste in storage tanks is analyzed whenever a new blend is made. Additionally, waste in the feed tanks is analyzed when the feed tanks receive a mixture of blend waste or a new waste. Direct burn trucks are sampled and analyzed for each batch. For waste streams that are new, unknown, or changed due to process changes, analysis is based on process knowledge and/or statistical analysis. Compatibility issues are less of an issue at CNF, with the exception of some raw material currently in use [e.g., sulfuric acid (H_2SO_4)]. However, before raw materials are mixed with waste materials in the CNF tanks, a compatibility check is performed.

All on-site generators of waste to be treated or stored at ETTP have received generator training that addresses compatibility issues. Waste streams that are received from an off-site generator must be packaged and identified in accordance with applicable Department of Transportation (DOT) regulations, which also address waste compatibility. Additionally, generators and operators of storage units for regulated waste must comply with the applicable federal and state regulations (e.g., 40 CFR, etc.). These regulations specifically address compatibility issues.

3.1.3.3 Over-pressurization protection

Two potential vulnerabilities have been identified at ETTP that could lead to over pressurization of waste containers. The vulnerabilities involve uncertainties associated with historic characterization data for legacy waste and long-term storage of waste. Section 3.8.2 of this report discusses these vulnerabilities and the associated corrective actions. Included in the corrective action plan, which was developed by the Waste Management organization, are lessons learned from an incident at the Paducah site, where concentrated acid was stored in overpack containers. A five-site committee of Waste Management personnel has been chartered to address lessons learned from the Paducah incident. Recommendations from this committee have been (and will be) incorporated into the ETTP corrective action plan.

Pressure relief devices are used on containers determined to contain waste streams that have the potential to cause over-pressurization problems. Identification and retrofitting of suspect containers, such as 55-gal drums, with pressure relief devices when necessary is an ongoing effort within the WM organization.

As part of WM storage operations, drums and containers are inspected weekly. If an over-pressurized drum or container is identified, all activities are stopped. The general supervisor is contacted, who in turn contacts the Park Shift Superintendent (PSS). Depending on the situation, the PSS may elect to convene the Hazard Material Deposition Committee. This committee includes operations personnel, craftsmen, and ES&H subject matter experts. After the appropriate corrective action has been identified, a work instruction is generated and used to ensure that the appropriate personal protection equipment is identified and the appropriate steps are followed to relieve the over-pressurized drum or container.

TSCAI

Over pressurization of drums is prevented by evaluating container compatibility with the materials before filling them. This is a simple process at TSCAI, since most of the wastes placed in containers are inert solids. Liquids and sludges are evaluated against the WAC, which requires testing for corrosivity to steel. Drum storage areas are inspected daily as part of the TSCAI integrated inspection program.

CNF

Over pressurization of containers of liquid waste generated at CNF is prevented by properly characterizing the waste and placing it into compatible containers. Waste sent to CNF for treatment is first evaluated against the CNF WAC. CNF has RCRA 90-day and satellite storage areas. These areas are inspected in accordance with RCRA requirements.

3.1.4 Laboratory Practices

ETTP has two primary organizations that engage in laboratory operations: the Analytical Services Organization (ASO) and the Technical Services Organization (TSO). Wastes are segregated at the point of generation to ensure safe and proper management and disposal. Waste is managed in accordance with federal and state regulations and applicable LMES, ETTP, and organization-specific policies, procedures, and standards. Waste streams that present unusual, potential, or imminent safety hazards are segregated or treated to remove the hazards before disposal. Methods for treatment of such waste are identified at the point of generation and are incorporated into appropriate procedures. Waste containers are stored by type and evaluated for bulking into larger containers. The evaluation includes, but is not limited to, process knowledge, generator waste inventory logs, compatibility testing, and consensus of laboratory and site ES&H personnel. All wastes generated in the laboratories are reviewed by a trained waste certification officer prior to shipment out of the laboratory. Excess chemicals are identified through self-assessment programs, management walkthroughs, and evaluations of chemical inventories.

Key polices, procedures, and standards that these laboratories operate under to ensure safe operation include the following:

- Organization Chemical Hygiene Plans;
- SPP-4111, *Hazardous Material Storage and Inspection*;
- SPP-4603, *Requirements for Low-Level Radioactive Wastes (LLW), Resource Conservation and Recovery Act (RCRA) Hazardous Wastes, and Polychlorinated Biphenyl (PCB) Wastes*;
- SH-132PD, *Hazardous Chemicals in Laboratories*; and
- SH-140PD, *Hazard Communication Program.*

In addition to the above, organization-specific practices are discussed in Appendix C.

3.1.5 Excess/Surplus Materials and Wastes

SPP-4600, *Identification of Excess/Surplus Materials and Wastes*, provides requirements for evaluating excess/surplus materials and wastes to properly identify them. Once materials and wastes are properly identified, the user is referred to the following guidance for the additional and specific requirements for the accumulation and packaging of materials and wastes for transfer to the receiving organization:

- SPP-4603, *Requirements for Low-Level Radioactive Wastes (LLW), Resource Conservation and Recovery Act (RCRA) Hazardous Wastes, and Polychlorinated Biphenyl (PCB) Wastes*;
- SPP-4605, *Requirements for Recycling*;
- SPP-4608, *Requirements for Conventional Wastes;*
- SPP-8751, *Release of Excess Equipment and/or Material*; and
- ORR Swap Shop.

MM-AP-204 requires annual review of inactive or overstocked stores inventory items. Excess chemicals in inventory are disposed of in accordance with SPP-8751 and 41 CFR, Chap. 101-43. Excess chemicals in unopened original containers, are transferred to other federal agencies or sold through Property Sales, as appropriate. Sales of excess chemicals require review and approval by the Site Hazardous Material Coordinator.

Inventory stock of chemicals is managed to ensure minimum stock levels. The majority of chemicals utilized at ETTP are procured through Accelerated Vendor Inventory Delivery and are not stocked in stores inventory.

Site personnel are encouraged to list excess chemicals in any quantity on the Swap Shop, a Web-based electronic reutilization system that is accessible to all DOE contractors and subcontractors at the Oak Ridge sites. This system provides a listing of materials and chemicals that are excess to the needs of particular organizations. This minimizes procurements of hazardous materials, reduces excess materials in storage, and reduces chemicals going into the waste stream.

Sect. 3.1.7 includes additional information regarding recent accomplishments in removing excess chemicals, wastes, and materials.

3.1.6 Pollution Prevention Program

The Pollution Prevention Program promotes and implements practices that reduce or eliminate the amount and toxicity of waste and pollutants in the air, water, and on land. Crucial activities of the Pollution Prevention Program involve improving operating practices by substituting less toxic or hazardous materials in process operations and changing processes to produce less toxic products and wastes whenever possible. The Pollution Prevention Program also promotes the use or substitution of nonhazardous materials for hazardous materials in operations to minimize potential risk to human health and the environment.

The Pollution Prevention Program has systematically performed Pollution Prevention Opportunity Assessments (PPOAs) of all waste generating processes at ETTP to identify source reduction and recycling projects. All source reduction and recycling projects identified during PPOAs are tracked in a three-site database. The projects, which often concern chemicals, are updated on a quarterly basis until they are either canceled or completed.

All ETTP personnel have access to the three-site electronic Swap Shop, which is administrated by the Property and Materials Management Division. The Swap Shop allows chemicals that are declared excess by one division or site to be available to another division or site. The Pollution Prevention Program supports, promotes, and monitors Swap Shop activities and incorporates ETTP-related results into the Pollution Prevention Information Management System database on a quarterly basis.

3.1.7 Accomplishments

The following are examples of projects and activities that resulted in a reduction of waste, removal of excess chemicals, and reduction of vulnerabilities:

CNF Acid Use Program–Approximately 1890 gal of acid that were collected from old process lines and acid tanks were utilized as a treatment chemical at CNF rather than being declared as RCRA hazardous waste. This project received a 1994 DOE-ORO Radioactive/Hazardous Waste Recycling Award in addition to a Site Pollution Prevention Award.

Condensate Polishers at K-1501–Installation of condensate polishers at the Steam Plant enabled the facility to reuse its condensate and reduce the waste stream sent to CNF for treatment. In addition to eliminating the need for 900,000 gal of make-up water/year, the project reduced sulfuric acid use by 20 tons/year and sodium hydroxide use by 1.8 tons/year.

Purchase of Non-Destructive Testing "M" Film Processor–The Quality Control Department uses radiographic X-rays to verify the internal integrity of material prior to its use. Traditionally, department personnel manually developed the X-ray film using relatively large quantities of photographic chemicals. The three-site High Value Return-on-Investment (HIVal) team gave the Quality Control Department $30,227 of Pollution Prevention funds for the purchase of a commercially available automatic film processing unit. Use of the automated processor reduced stopbath use by 100% and fixer and developer by 50%.

Waste Minimization at the ETTP Site Paint Shop–As a result of significant effort, the Maintenance Division was able to find another use for 4700 gal of paint and epoxy that were about to expire. The division then changed its operating practices to permanently reduce its paint inventory by 90%.

Digital Imaging–The Information Management Services Division was encouraged to prepare a Pollution Prevention funding proposal to replace 25% of its traditional chemistry-based photographic process with a digital photographic technology. This three-site Pollution Prevention project was awarded $38,589 of DOE-Headquarters (HQ) Return-on-Investment project funding.

Column Waste Reduction Using Automated Solid Phase Extraction (SPE) System–The three-site HIVal team awarded ASO $74,297 of Pollution Prevention funding to purchase a Gilson ASPEC XL SPE System. This new equipment reduces by 50% acid waste from conditioning the columns used in the determination of radioisotopes in samples. The system delivers acid in low pressures to the columns, resulting in more efficient use of acid and less exposure to workers.

Lithium Hydroxide Sale–Arrangements have been made and all activities are underway to remove 55,000 drums (23,500,000 lb) of lithium hydroxide (LiOH), currently located in the K-25 Building vaults. To date, over 80% (18,000,000 lb) of LiOH has been removed.

Coolant Removal–Approximately 5,000,000 lb of chlorofluorocarbon-114 coolant, an asphyxiant stored in the shut-down process buildings at ETTP, have been removed and shipped to the operating gaseous diffusion plants (Paducah and Portsmouth) for their use. Approximately 600,000 lb of C-816 coolant has also been removed from other ETTP process buildings and sold to a private company.

Chemical Removal at K-1416–Approximately 900 lb of nickel sulfate and 270 lb of a chlorinated solvent, trade name “Gensolve,” have been removed from the K-1416 Building and shipped off site.

Flammable Material Removal at K-1098-F–Approximately 2000 gal of flammables and 40 gal of suspect carcinogenic painting materials have been removed from K-1098-F Building and shipped off site.

Chlorine Removal at K-1055-A–Two 1-ton chlorine cylinders, stored at a central location (K-1055-A Building) for eventual use at the off-site water treatment plant (K-1515 Building), have been eliminated. Chlorine shipments are now made directly to the K-1515 Building from the supplier on an as-needed schedule.

Chlorine Removal from K-1203 and K-802–Four 150-lb chlorine cylinders, used for water treatment at K-802 and wastewater treatment at K-1203, have been eliminated by conversion to ultraviolet radiation.

Ammonia and Chlorine Removal from K-1055–All ammonia and chlorine cylinders stored at K-1055 for use at ETTP have been eliminated. Ammonia developed blueprints have been replaced by xerography.

Acid Removal from K-1404–Approximately 4000 gal of hydrochloric acid (HCl) previously stored at a central location (K-1404 Building) have been removed and transferred to CNF for use in waste effluent treatment.

Improved Acid Storage at Steam Plant–A new, double-walled 4000-gal tank has been installed to replace a 12,500-gal tank to store sulfuric acid (H_2SO_4) that is used during Steam Plant water treatment. This has resulted in an inventory reduction of 8500 gal of H_2SO_4.

TSCAI–From fiscal year (FY) 1991 through FY 1997, TSCAI incinerated over 20,000,000 lb of polychlorinated biphenyl (PCB) mixed waste. Some of the major hazardous waste constituents have included 1,1,1-trichloroethane, acetone, carbon tetrachloride, chloroform, ethanol, ethyl benzene, methylene chloride, tetrachloroethylene, toluene, tributyl phosphate, and xylene.

Legacy Waste Sorting–Approximately 71,000 ft^3 of low-level waste contained in B-25 boxes, landsea containers, and 55-gal drums was sorted and segregated by waste type during FY 1997. When initially put in containers, multiple waste types were placed in single containers. Sorting of this waste eliminated potential incompatibility issues associated with storing multiple waste types in the same container and allowed selecting multiple options for treatment, storage, or disposal.

Surplus Legacy Materials–During the last 3 years as part of the S&MP facility stabilization effort, legacy surplus materials have been removed from facilities. These materials (e.g., instruments, clean metal, etc.) were recycled by other users or sent to Property Sales for public offering. During this time, approximately 28,000 items, with an estimated total value in excess of $10 million, have been dispositioned.

ASO Excess Chemical Disposal–During FY 1997, ASO disposed of approximately 378 L of off-specification or out of date chemicals and standard materials. The majority of these chemicals were the result of periodic laboratory clean out efforts. Volumes of individual chemicals range from 5 mL to about 4 L. Approximately 10% of the waste disposed of was laboratory-generated standard materials that are prepared daily, weekly, or monthly by laboratory personnel. These chemicals have a short shelf life and must be disposed of on a routine basis. Recent Pollution Prevention efforts have reduced the volume of this waste stream by 60%.

3.1.8 Performance Metrics

Appendix D includes sample performance metrics used at ETTP regarding the reduction of waste, excess chemicals, and other potential vulnerabilities.

3.2 HAZARDOUS MATERIALS MANAGEMENT PROGRAM

3.2.1 System Overview

The ETTP hazardous materials management program is founded on a basic ES&H administrative strategy of applying (1) procedures and standards, (2) information management systems, and (3) highly qualified people to safely and effectively carry out the challenging tasks at a hazardous materials work site. As implemented, the program embodies the basic concepts of integrated safety management contained in DOE Policy 450.4, *Safety Management System Policy*. Additional command media that apply more directly to hazardous materials management include SH-132PD, *Hazardous Chemicals in Laboratories*; SH-140PD, *Lockheed Martin Energy Systems Hazard Communication Program*; and SH-161-PD, *Hazardous Waste Operations and Emergency Response (HAZWOPER)*.

The basic command media are further implemented at ETTP with procedures that include ESP-ESH-16, *Hazardous Materials Inventory Program*; SPP-4013, *Waste Site Identification and Characterization;* SPP-4111, *Hazardous Material Storage and Inspection;* SPP-4600, *Identification of Excess/Surplus Materials and Wastes;* SPP-5650, *Fire Protection Program;* SPP-5767, *Hazardous Materials Inventory System (HMIS)*; and others. A summary of key command media is included in Appendix A. Together, these procedures cover hazardous materials and wastes remaining at ETTP from past operations, and address the purchase, handling, storage, use, and final disposition of the many additional chemicals needed for current operations. Incorporated into these site-level procedures is the guidance that ensures compliance with ES&H regulations.

3.2.2 Hazardous Material Tracking

Hazardous Material Inventory System (HMIS) is an ORR-wide electronic tracking and control system for hazardous chemical inventory that supports the ES&H regulatory and management needs of Energy Systems. The system contains more than 100,000 hazardous material items and processes more that 2000 transactions each month. It also interfaces with the company's procurement systems to record purchase activity, material location, volume/weight amounts, and basic regulatory reporting information. HMIS uses Material Safety Data Sheet (MSDS) health, safety, and hazard information to associate hazardous items with control lists and to provide internal reports of regulated and controlled materials [e.g., carcinogens, reproductive toxins, Environmental Protection Agency (EPA) Extremely Hazardous Substances, ozone-depleting substances, TSCA-listed materials, and Emergency Planning and Community Right-to-Know Act (EPCRA) 313 chemicals]. It generates supporting documentation for the EPCRA 312 chemical

inventory report and for other recurring reports and special requests. HMIS provides the option for users to flag excess material and to browse the Excess Material List to identify materials available for reuse. Additional HMIS features are included in the following modules:

HMIS/Procurement Interface Module–Allows an up-front hazard evaluation of all material requisitions prior to purchase and ensures that all hazardous materials are properly identified and that MSDSs are readily available. Pollution prevention, waste minimization, or hazard reduction by substitution of less hazardous materials may also be considered and applied prior to a hazardous material being brought on-site.

Hazardous Materials Inventory Module–Provides the ability to track and maintain chemical inventory information needed for regulatory compliance reporting under the EPCRA.

HMIS Report Module–Generates various reports interactively upon request of HMIS-trained users of the system. This module provides chemical custodians with an inventory-tracking capability, as well a source of information about chemical purchases and use. The EPCRA Compliance Manager uses this module to monitor site inventory totals for each chemical that could be reportable.

System Manager Module–Allows system managers to monitor system activity, maintain error reports, lists, tables, and codes, manage access to the system, and perform quality assurance.

At ETTP, the implementation of HMIS took place over several years, first with the management modules and then by gradual interface with more and more site personnel with the user modules. Manual methods of chemical inventory and tracking were phased out, and, in 1996, HMIS was designated as the primary means of chemical inventory management. Although some baseline inventory discrepancies continue to be uncovered by facility walkdowns, the degree of accuracy has reached the point where HMIS is reliable for use in regulatory report preparation and for overall support to the chemical management program, where it has become indispensable.

3.2.3 Hazard Communication

The Energy Systems Hazard Communication Program Description, SH-140PD, outlines the methods for communicating the potential hazards of chemicals used in the work place to workers. These methods include employee training, container labeling, and use of MSDSs.

Awareness level hazard communication training is provided for Energy Systems employees, service subcontractors, and visitors during General Employee Training (GET). Additional hazard communication training (Hazard Communication Level I) is provided based on the potential for exposure to hazardous chemicals. Work area (job-specific) hazard communication training is provided by the responsible supervisor upon the employee's initial entry into the work area and whenever a new hazard is introduced into the work area. A more complete discussion of training is provided in Sect. 5. Labeling is used to identify hazardous chemicals and associated hazards.

MSDSs for hazardous chemicals used in work areas must be accessible to employees, service subcontractors, and visitors. Each MSDS provides detailed hazard information such as material compatibility data for chemicals purchased from the manufacturer and chemicals produced as byproducts or manufactured in the workplace. The responsible supervisor of each work area maintains a list of the hazardous chemicals used in the work area. This list and corresponding MSDSs are readily available to workers for review.

3.2.4 Process Safety Management

A series of site surveys, including observations from a DOE-Office of Environment, Safety, and Health assist visit for process safety management (PSM) in August, 1996, determined that the applicability of 29 CFR 1910.119 (PSM) extended only to the site water treatment plant, K-1515, and TSCAI. K-1515 uses liquid chlorine in two 1-ton cylinders, thereby exceeding the 1500 lb PSM threshold quantity (TQ). TSCAI was determined to exceed the 10,000 lb TQ for flammables in process. Other facilities, such as K-1036A Building and K-711, are permitted to process quantities of hazardous materials that could exceed PSM TQs, but are subject to administrative controls that maintain quantities below those limits. Potential increases in facility inventories that could result in exceeding TQs are controlled by application of FS 102, *Unreviewed Safety Question Determinations* (USQDs), as well as, for purchased chemicals, by application of HMIS, which automatically flags PSM (and other) TQs.

The Safety Authorization Basis (SAB) for the water treatment plant consists of (1) *Preliminary Hazard Analysis for Building K-1515 Sanitary Water Treatment Plant*, K/HS 619, and (2) *Auditable Safety Analysis*, ASA/K-1515/PK/06/R1. Additionally, the *Process Safety Management Program Manual for K-1515 Sanitary Water Plant* was developed by the Utilities organization with assistance from Facility Safety. The manual details how all requirements of the PSM rule are met.

The SAB for the TSCAI facility consists of ASA/TSCA/25/R1, which contains qualitative accident analysis adequate to replace the preliminary hazard analysis. Similarly, a PSM Program Manual was also developed by TSCAI personnel and reviewed and approved by the site Safety, Health, and Environmental Review Committee (SHERC).

3.2.5 EPA Risk Management Program

The 40 CFR 68 Risk Management Program (RMP) rule is not applicable until June 1999. A site survey conducted September–November 1996 identified the Sanitary Water Plant, K-1515, as the only facility that exceeded EPA RMP TQs. A proposed 40 CFR 68 compliance plan, included in the Highly Hazardous Chemical Inventory Assessment of November 22, 1996, concluded that the work already done to address PSM largely satisfies RMP requirements with minor additional work to demonstrate compliance. The need to demonstrate compliance with 40 CFR 68 will be incumbent on the new managing and integrating (M&I) contractor, unless the facility is transferred to another DOE prime contractor.

As with the PSM rule addressed above, potential increases in chemical inventories such that EPA RMP thresholds would be exceeded are required to be evaluated in accordance with FS 102, *USQDs*, and the HMIS database flags RMP TQs.

3.2.6 Laboratory Practices

In addition to the LMES and ETTP procedures relating to hazardous materials and waste management mentioned in Sect. 3.1.4, ETTP laboratories (ASO and TSO) maintain laboratory-specific chemical hygiene plans (CHPs). The CHPs meet requirements of OSHA standard 29 CFR 1910.1450 and were developed according to guidelines and models for other plans. The CHPs identify procedures and work practices that are necessary for the protection of personnel. The CHPs also provide procedures and guidance to minimize opportunity for chemical incompatibility accidents or incidents involving materials that contain special hazards, such as explosives, pyrophorics, and peroxidizables.

Laboratories maintain a detailed inventory of chemicals using HMIS as described in Sect. 3.2.2. Safe storage of chemicals is also maintained by following recommended guidance from manufacturers, including recommendations relative to shelf life and expiration date. In addition to the above, organization-specific practices are discussed in Appendix C.

3.3 FACILITY SAFETY PROGRAM

The ETTP Facility Safety Program integrates several diverse technical, administrative, and operational disciplines. These disciplines function to identify, analyze, and verify the control of hazards associated with operations and activities that potentially impact the health and safety of personnel at or near the ETTP site.

The mission of the program is to provide a consolidated method for the identification and evaluation of hazards, control and minimization of analyzed hazards, and the communication of results to ETTP site personnel. The product of the ETTP Site Facility Safety Program is documented in SAB for the operation of facilities and activities on site that have been shown by evaluation and analysis to present only an acceptable risk to on-site or off-site personnel or the environment. Development and issuance of the SAB documents establish the operational boundaries or “envelope” that must be maintained by the facility operator and personnel to have continued safe operations and compliance with regulatory requirements.

The primary function of Facility Safety is risk reduction. This is achieved by ensuring that activities have been appropriately evaluated for hazard potential. Activities with unacceptable risks are prohibited. For activities with inherent hazards, measures must be devised to ensure that the hazards are controlled and do not pose an unacceptable risk to personnel.

3.3.1 Scope of Facility Safety Program

The ETTP Site Facility Safety Program described within this document applies to all facilities under the operational control of ETTP Site management. These facilities include those within the recognized site boundaries and those off-site facilities operated or occupied by ETTP personnel.

A "facility" can be a fixed building or structure, a mobile structure such as a trailer, or a geographical location such as a landfill, storage tank, or environmental monitoring station. Baseline preliminary hazard screenings are required for all facilities. Additional analyses are required for significant hazards identified in the baseline screening process. The screening criteria for hazardous chemicals is based on DOE EM Standard 5502-94 and 40CFR 302.4, Reportable Quantities.

3.3.2 Program Applicability

The ETTP Site Facility Safety Program applies to all activities, operations, or processes that can adversely affect the health and safety of on-site or off-site personnel. These activities are typically associated with the use of toxic, reactive, or radiological materials or materials with unfavorable physical properties (flammable, explosive, asphyxiants). Additional activities, operations, and processes that fall under the ETTP Site Facility Safety Program are those with unusual or hazardous energy sources or equipment not typically controlled by general industry standards requirements.

3.3.3 Facility Safety Program Requirements

Facility Safety Program guidance and direction is obtained from numerous sources. Governmental regulations, Lockheed Martin Corporate, Energy Systems and ETTP site-specific policies, program documents and procedures establish the requirements and guidelines for the site's Facility Safety Program. These documents are readily available to site personnel through electronic databases and paper texts. The primary Energy Systems documents that present the scope, purpose, and operation of Facility Safety Programs are FS-101PD, *Facility Safety Program*; FS-102, *Unreviewed Safety Question Determinations*; and FS-103PD, *Safety Documentation*. A description of each of these command media is included in Appendix A. Additionally, a Reindustrialization Business Practice, dated October 14, 1997, describes Facility Safety responsibilities and actions associated with the LMES/DOE/Community Reuse Organization of East Tennessee/Lessee reindustrialization interfaces (see Sect. 3.4.4).

3.4 REINDUSTRIALIZATION PROGRAM

Several different avenues exist by which lessees provide DOE-ORO and LMES with information regarding the use, storage, and disposal of chemicals. Although some information regarding chemical usage will be obtained in the course of lease discussions and site visits by the prospective lessee, a number of formal and established means exist to collect information. This information is provided both during the lease development and after the lease is signed.

3.4.1 National Environmental Policy Act Reviews

The National Environmental Policy Act (NEPA) provides a means to evaluate the potential environmental impact of proposed federal activities and to examine alternatives to those actions to ensure informed decision-making. LMES procedure ESP-EP-163, *National Environmental Policy Act Review and Compliance*, establishes administrative controls and provides requirements for project reviews and compliance with NEPA. Each proposed action and all

components of the action are reviewed for the potential to result in significant impacts to the environment. Based on technical information supplied by the responsible organization, an appropriate level of NEPA documentation is prepared. NEPA reviews are conducted early in the planning cycle to provide input into the decision-making process, thus allowing time for changes prior to construction or prior to proceeding with process implementation. The Energy Systems Reindustrialization Organization uses the NEPA review process as part of an overall environmental review to evaluate every new lease and assess potential impacts before recommending that a lease be executed.

3.4.2 Environmental Review Checklist

Every potential lessee completes a checklist entitled *Environmental Review Checklist for Proposed Lease Actions*. The checklist is a screening tool to provide a qualitative means to understand the proposed lease, including actions to be taken by the lessee and DOE, and to assist in determining the level of NEPA documentation required. The decision evaluated in this NEPA review is DOE's decision to lease. Although lessee operations are independently permitted, regulated, and/or licensed, a necessary component of DOE's lease decision is the need to understand, and find acceptable, the activities of the lessee. This evaluation occurs during the environmental review and thereby addresses DOE's responsibilities under NEPA (i.e., to consider all reasonably foreseeable actions.) The lessee must describe the components of planned activities, including an identification of the process, the types and amounts of chemicals and other materials to be stored and used, and the waste expected to be generated. The checklist is then reviewed by both the Reindustrialization Organization and the Environmental Compliance Organization, and a recommendation is made to DOE regarding the appropriate level of NEPA documentation. Documentation is then prepared, reviewed, and approved by appropriate personnel prior to the leasing, and the information is considered when identifying lease restrictions.

3.4.3 Comprehensive Environmental Response, Compensation, and Liability Act 120(h) Review Process

An assessment, following the process set forth in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 120(h)(4), is conducted for each property (i.e., building or land) being leased by DOE-ORO. This assessment is documented in a report detailing the findings of the assessment and indicating whether the property is uncontaminated or contaminated as defined by CERCLA. A copy of this report is provided to EPA Region IV and the State of Tennessee for review. A copy of the report is also provided to the lessee as an attachment to the lease document.

The majority of the property comprising the ORR was rural, and either wooded or used for agricultural purposes, before its acquisition by the U. S. Government in World War II. Consequently, the use of any significant amounts of hazardous substances or petroleum products, or the release or disposal of such substances, would have occurred after the property's purchase by the U. S. Government. Therefore, the focus of the CERCLA 120(h) report is on the property and any improvements made to the property after such purchase. Examples of references used in the assessment include the following:

- facility hazard screen analyses,
- chemical inventories,
- historical photographs,
- spill reports and occurrence reports,
- historical quarterly plant reports,
- radiological surveys, and
- asbestos surveys.

Although CERCLA 120(h) does not require that additional sampling be conducted, in some instances where data does not exist, is not recent, or is inadequate, DOE has determined that additional sampling is necessary to support a particular lease. This additional sampling has been limited to new radiological surveys of the property. The information from these surveys is then incorporated into the CERCLA 120(h) assessment and report. To date, no additional sampling has been conducted for possible chemical contamination in those buildings exclusively designated for reindustrialization.

3.4.4 Facility Safety Hazard Evaluation and Notification

Lessee hazards to be brought on site are identified by the lessee to LMES Reindustrialization account executives documented on the Reindustrialization Hazard Evaluation Worksheet, and evaluated by Facility Safety for their potential impact on the existing safety basis documents. A Reindustrialization Business Practice-Lessee-Hazard Evaluation Worksheet, jointly developed by LMES Facility Safety and LMES and DOE Reindustrialization personnel, revised October 14, 1997, documents the process. A flowchart depicting the logic of the process is used by Facility Safety for evaluation and decision making. The Business Practice worksheet and flowchart were presented to both the site's SHERC and the DOE/LMES Safety Analysis Report Working Group for comment and information, and comments were resolved before use. The process results in a "potential USQ" provided to DOE and notification provided to cognizant site personnel if lessee hazards are determined to be greater than those already allowed by the safety authorization for the leased facility. If changes to the lessee's operation or activities are made, the worksheet is to be revised reflecting new hazard information to allow reevaluation by Facility Safety.

3.4.5 Lease Conditions

Assessing the need for lease restrictions is an integral part of the development of each lease initiated by DOE's reindustrialization program. Restrictions may be in the form of standard clauses used in all leases or special restrictions that are lease specific.

DOE-ORO has developed generic lease language that is common to all leases. One clause in the generic lease directly addresses hazardous chemicals brought on site by the lessee. This clause reads

> ***WASTES OR MATERIALS HAZARDOUS AND/OR RADIOLOGICAL****– Upon request by DOE the Lessee shall provide a complete listing of all hazardous and/or radiological wastes or materials utilized, expected to be manufactured, shipped, or received by the Lessee or sublessee(s) during the term of this Lease.*

Other standard clauses indirectly address hazardous chemicals in regard to other aspects of the lessee's operations. Another clause requires the lessee to comply with all applicable laws, ordinances, and regulations of the federal, state, county, and municipal governments. Another clause specifically addresses RCRA and requires the lessee to comply with the RCRA hazardous waste permit (if applicable) or its state equivalent.

These standard clauses may be supplemented by "special restrictions" that are lease specific. The need for such restrictions is considered for each lease. Factors that help determine the need for additional restrictions beyond the standard language include the location of the leased space on site; the history of the leased premises; the nature of the lessee's business; the potential for any hazardous chemical, petroleum product, or waste associated with the business being added to the site; and any effects from, or upon, nearby remedial actions being undertaken by DOE.

3.5 SURVEILLANCE AND MAINTENANCE PROGRAM

On May 22, 1995, DOE and EPA agreed to the *Policy on Decommissioning of Department of Energy Facilities under CERCLA*. This policy established the decommissioning of DOE facilities under the regulatory authority of CERCLA with implementation under the Federal Facility Agreement (FFA) for Oak Ridge.

All FFA projects, including remedial actions, surveillance and maintenance (S&M), and D&D, are evaluated using a risk-based prioritization system that includes regulatory and public involvement to rank projects. In Tennessee, FFA milestones are developed for a 3-year period. The current-year milestones are then reviewed to reflect current-year funding levels. The project rankings and available funding determine which projects are funded, with particular emphasis on completing active projects prior to starting new projects. New D&D projects have been started at ETTP in the latter part of FY 1997 as funding, in accordance with the prioritization process, has become available. The Group I Building Demolition Project, which includes the K-1131 and K-725 buildings, has been started to disposition these deteriorating facilities.

Many additional buildings at ETTP require D&D. These buildings, which number over 300, are included in the Accelerated Cleanup Plan and are in the queue with other cleanup projects for initiation when ranking and funding availability allow the projects to begin. The current rankings of these facilities are expected to change during the decision process leading up to the CERCLA ETTP-wide Record of Decision (ROD). As facility risks are analyzed against soil and groundwater risks, a new integrated, logic-driven, and prioritized list of projects will be generated as part of the ROD and will form the basis for the cleanup schedule at ETTP.

Selected removal actions, such as the Group I project, will be done based on the need for near-term action, and removal actions for disposition of deteriorating facilities will be accelerated as funding allows. In addition, an active S&M program will continue to provide routine inspections and maintenance within the boundaries of funding and reasonable levels of care (using a graded approach) for facilities that are expected to be demolished in the future.

The ETTP Surveillance and Maintenance (S&M) Program is proceeding with the task of stabilizing (decommissioning) those S&M facilities that are no longer used or needed. Facilities in the ETTP S&MP never underwent EM-60 stabilization activities. Ultimately, all facilities will be stabilized or transferred to the site for reuse. However, with so many facilities requiring near-term attention, S&M has been moving aggressively to assess the condition of the affected facilities and to deactivate them on a prioritized basis, thus achieving the maximum degree of protection to employees, the public, and the environment in the shortest possible period.

For each facility, the overall objective of stabilization activities is to achieve, as quickly and economically as possible, a safe, stable, and environmentally sound condition, suitable for an extended period. Once stabilized, pending ultimate disposition, the facility is to be kept in its stable condition by means of a methodical S&M program.

3.5.1 Abandoned-In-Place Process

After approving shutdown of sprinkler systems in several small buildings, DOE-HQ requested that a system of controls be implemented to ensure that materials were not stored in the buildings, that unauthorized access was not permitted, and that a system be put in place to track occupancy of and activities in the buildings. The S&MP developed the “abandoned-in-place” (AIP) designation as a means of controlling and documenting access, controlling activities, and thereby limiting employee exposure to hazards in buildings awaiting decommissioning. Under S&MP policy a facility can be declared AIP by conducting various levels of stabilization activities.

Facility stabilization involves a range of tasks. These tasks include (1) material removal (hazardous, combustible or surplus); (2) radiation assessment/controls (elimination or shielding, where applicable); (3) contamination controls (updating postings resulting from decontamination efforts); (4) installation of monitors and alarms; (5) review/update of facility safety documentation; (6) review of facility activities; and (7) deactivation of all non-essential systems. When these tasks are accomplished, a facility may be declared AIP. For each facility declared AIP, the overall objective of the selected stabilization activities is to achieve containment and reduce employee exposure to facility hazards.

A facility, floor, unit, vault, or area within a building, which in this document will be identified as a “space,” may be deemed stabilized and declared abandoned. All abandoned spaces must be clearly identified with physical boundaries (e.g., walls, flagging, fencing, ropes, etc.); access points properly identified by posting an S&M abandoned space sign; badge readers removed from service; doors rekeyed; and access strictly controlled by an Access Authorization Permit (AAP).

The permit will be used by S&M to monitor and control all activities within the abandoned spaces. All activities conducted in AIP spaces are considered "off normal" and must be reported to the PSS Office before the activity occurs. The permit requires that the permit issuers conduct a review of current facility conditions and review the associated permit requirements with personnel entering the building before issuing the AAP. Authorized access will be tracked by information gathered from the AAPs. All employees entering an abandoned space must sign the permit. There will be no standing permits. The building operator, the building operator's designated relief, or the PSS may authorize access to abandoned areas via the AAP. The PSS is to receive a copy of all AAPs.

Spaces are not to be used for material storage. The ETTP Fire Department and ETTP Fire Protection Engineering personnel may conduct routine inspections on all abandoned facilities. When an entire facility is declared AIP there will be no attempt to enter or save the building from fire loss. Fire fighting efforts should be directed toward the "stand off and protect" tactical approach, preventing spread of the fire.

Spaces are rekeyed (where applicable and necessary), and all entrances are identified with an S&M tamper-indicating device (TID). The TIDs should be placed so that a drive-by surveillance can be conducted. The TIDs are not an accountable item. They are a visual aid to help determine if a space has been entered.

Activities permitted within the abandoned spaces must be consolidated and reduced to the absolute minimum necessary to maintain the facility safety envelope and to meet S&M activities. All activities should be performed during the day shift. Day shift is 7 a.m. through 3:30 p.m. Any non-emergency activities occurring in an abandoned space after 3:30 p.m. require the approval of the S&M Project Manager. All personnel entering an abandoned space are required to carry portable lighting and portable communication equipment.

Facility status with respect to this stabilization process for each of the S&M facilities is summarized in Appendix E. The table also depicts the principle hazards in each facility.

3.5.2 Facility Status Review

A Facility Status Review has been initiated to provide DOE with a snapshot-in-time of the overall conditions of the D&D buildings maintained by the S&MP at ETTP. This activity utilizes the Condition Assessment System (CAS) to provide a standardized approach to surveying facilities. The facility evaluation will cover (1) the physical conditions of the structures from the foundation up; (2) the condition of equipment and materials housed within the structure; (3) health and safety concerns within the structure; and (4) health physics, industrial hygiene, safeguards and security, and fire protection issues.

The assessment results are used to document conditions that are compliant and stable, as well as conditions that, if unabated, could deteriorate to the point of posing a hazard to ETTP personnel or the general public. Any identified health and safety concerns are reported for immediate evaluation. Buildings previously designated as AIP are some of the first being assessed under this

initiative. CAS assessments have been completed in 33 buildings, and CAS assessments of the remaining 55 buildings managed by the S&MP will be completed by July 1998.

Baseline information will be formatted in an electronic database. The data will be updated quarterly to annually, using a graded approach for buildings of higher concern. A Web-based information system will be available for managers to call up the status of the buildings.

3.5.3 Hazardous Waste and Materials Management

S&M maintains and operates hazardous material control areas (HMCA) in compliance with SPP-4111 for the safe handling and storage of hazardous materials. Hazardous and toxic wastes are collected and disposed of in a compliant manner following the guidance in SSP-4603. The project operates a RCRA 90-day storage area. If the waste is recyclable, SPP-4605 is used as a guideline.

All HMCAs are registered and inspected on a monthly basis. After the inspection, the HMCA inventory is updated. Waste storage areas are maintained and inspected on a periodic basis. The owner/operator also logs any problems associated with area and the addition or removal of any waste. All facilities are walked down periodically (at least annually), and some buildings are cleaned out and placed in AIP status. During both processes, hazardous material information is gathered. Usable material is moved to HMCAs, and waste is dispositioned using SPP-4603.

If any excess chemicals are found during walkdowns, clean up, or day-to-day activities, a use for that chemical is identified. If a use cannot be identified, the material is either surplused or disposed of as waste. The disposal of unneeded chemicals and waste is an active part of the S&M Program. S&M wants to reduce the associated hazards and potential exposures of workers, the public, and the environment to these materials and to reduce S&M programmatic costs. During the last 3 years approximately 100,000 ft^3 of waste has been generated and transferred to the WM organization. The material was primarily low-level waste, but also included RCRA, PCB, and asbestos wastes. This volume of waste is sufficient to fill about 39 land/sea trailers. Each of these trailers is 40 ft long.

During this time, the S&M Program has also dispositioned large quantities of unneeded chemicals. Epoxy resin materials remaining from the gas centrifuge program and coolants from the gaseous diffusion process were sold to private buyers. Inventories of this material included approximately 3,000,000 lb of epoxy resin and 600,000 lb of coolant. Approximately 278,000 gal of used lubricating oil was transferred to TSCAI for disposal, and about 400 gas cylinders have been returned to the Property and Materials organization for recycle or return to the cylinder supplier.

3.6 FACILITY ASSESSMENTS AND WALKDOWNS

In addition to reviewing known vulnerabilities identified in previous assessments, organizations at ETTP were asked to conduct a series of walkdowns and facility assessments. The purpose of these assessments and walkdowns was two fold: (1) to verify that existing management systems

involving hazardous materials and waste are being implemented and (2) identify any new vulnerabilities that may have not been previously identified.

3.6.1 Methodology

The following general instructions were provided to all organizations that use or store hazardous chemicals at ETTP. A list of target facilities was provided; however, other facilities that store or contain chemicals or residual hazardous materials were also to be included in the assessments. Special emphasis was placed on facilities that were shut down or inactive. An information/ awareness session was held for those responsible for conducting the assessment on October 7, 1997. The purpose of the awareness session was to discuss the Hanford incident, share lessons learned, and provide the following directions for conducting the assessment.

1. Complete the October 1997 monthly HMIS update by confirming and/or changing the existing database inventory on a HMIS Hazardous Material Accountability Report for each storage area.

2. Identify on the Unlisted Chemical/Materials Survey form chemicals and materials found during the assessment that are not listed in the HMIS inventory; (e.g., chemicals/materials in vaults or otherwise NOT in a designated Hazardous Material Control Area).

3. Identify on the Residual Chemical/Material Survey form any “residual” chemicals or materials in process piping, tanks, ventilation ducts, etc. This effort should focus on inactive facilities and systems.

4. Wherever chemicals (whether residual, unlisted, in HMIS, or in generator waste storage areas) are located, check for potential chemical incompatibilities using chemical compatibility charts and other guidance. Complete the Material Incompatibility Summary form for all areas assessed, including those areas where no incompatibilities were found.

In addition to the above, in September 1997, an inventory of gas cylinders on site was conducted. An inventory form and instructions were provided with the intent of obtaining consistent survey results. The purpose of the inventory was to motivate users to physically examine gas cylinders, determine if there were any safety concerns, and provide immediate corrections; or, if there were no further uses for the material, to initiate return to vendor or appropriate disposal. The cylinder inventory provides only a snapshot-in-time because of the various uses and dispositions of cylinders.

3.6.2 Results

This section summarizes general results from the assessment/walkdowns. Observed conditions and vulnerabilities requiring corrective actions are discussed in Sect. 3.8.

Hazardous Material Accountability Report

There are 245 chemical storage areas registered in HMIS; an increasing number of the designated storage areas contain no inventory because they are being phased out as part of facility shutdowns and/or reindustrialization. As a result, approximately 200 areas were included in the facility walkdowns in October 1997. Special emphasis was placed on verifying the accuracy of the Hazardous Material Accountability Report, which is an item-by-item inventory for each storage area. In addition to the routine process of updating HMIS to reflect chemical usage, system maintenance is occasionally needed because of organizational changes, custodial changes, and building shutdowns or changes of the responsible owner/operator.

One concern was identified that has prevented reliable automatic updating of the HMIS inventory of Property and Materials Management to reflect ETTP stores transactions. As a result, an apparent buildup of inventory has occurred in HMIS, while there have been reductions in actual inventory. This discrepancy has been identified to the HMIS program office, and it represents an action item discussed in Sect. 3.8.

Unlisted Chemical/Materials Survey

Some items with chemical ingredients were identified that were not listed on the HMIS Accountability Reports. This omission could result from moving items from one storage area to another, or it could be traceable to items in inventory before HMIS was fully implemented in 1996. While those unlisted items were generally not of significant quantities for any safety concern, work began immediately to add these items as appropriate to the inventory tracking system. There remain some items with potential chemical ingredients, legacy materials, and possible waste materials that require further review and evaluation for accountability and inventory tracking. An ETTP-level review team has been established to carry out this evaluation (see Sect. 3.8).

Residual Chemical/Material Survey

Based on a preliminary assessment of the inventory, there were no significant quantities of residuals listed that might present a safety and health hazard. Further assessments are being made by the ETTP Chemical Review Team. Inventory sheets indicated that residual chemicals were present in a wide range of forms and amounts. Examples included activated alumina; lime; compressed gases, such as oxygen, nitrogen and acetylene; hydraulic oil; lube oil; mineral oil; and similar materials.

Material Incompatibility Summary

No significant chemical incompatibilities were identified during the facility walkdowns. It is common to have small amounts of incompatible chemicals (e.g., laboratory chemicals or maintenance products) in a single storage area if they are properly separated and secondary containment is ensured. Reports were received of storage improvements being made during the walkdowns, but the primary accomplishment during this phase of the surveys was an increased awareness of chemical incompatibility hazards.

Gas Cylinder Inventory and Assessment

Nineteen organizations responded as having in possession a total of over 2000 compressed gas cylinders. This includes cylinders that were full, partially full, and empty. The total includes vendor- and government-owned cylinders. The following observations were noted: (1) numerous cylinders were noted as not having a planned use within the next 90 days; (2) the inventory does not include an additional 1500–2000 government-owned cylinders; however, these cylinders contain typical industrial gases such as oxygen, nitrogen, and acetylene and do not pose unusual or special safety hazards; (3) a number of the higher toxicity gas cylinders (e.g., ClF_3, fluorine) and those of unknown contents are to be processed at an on-site treatment system (Transportable Compressed Gas Cylinder Skid); and (4) plans are being made to expand the capability of the Transportable Compressed Gas Cylinder Skid to treat additional cylinders on site. Documented site policy or guidance relative to the use, management, or disposal of compressed gas cylinders is needed.

3.7 WASTE STORAGE TANK AND ANCILLARY EQUIPMENT ASSESSMENT

A letter from Secretary of Energy Federico Peña, dated October 21, 1997, requests that all sites perform an assessment of hazards associated with chemical and radioactive waste storage tanks and ancillary equipment. ETTP has initiated a program to evaluate all waste storage tanks, including active tanks still in use and inactive tanks no longer in service. During 1995, ETTP conducted a comprehensive inspection program to assess all storage tanks and respond to questions raised by the Defense Nuclear Facility Safety Board. As a result of this effort, the ETTP developed a *Bulk Storage-Tank Database* document, which includes detailed information on all known tanks. The tank database document is updated annually and is incorporated into the site's Spill Prevention Control and Countermeasures Plan.

The scope of this assessment includes storage tanks that are defined as enclosed vessels with in/out process lines and having greater than 100-gal capacity. Excluded are sumps, pits, trenches, water holes, cylinders, converters, compressed gas and liquid nitrogen containers, and atmospheric containers with open tops and basins. In evaluating the waste storage tanks, a multistep approach is used to screen out tanks that do not create a chemical or radioactive hazard and identify those tanks that may require additional analysis to determine if there is a potential vulnerability. The first step in the waste storage tank assessment was to develop a hazard criteria checklist and perform an initial screening of the tanks listed in the *Bulk Storage-Tank Database* document. The tanks that are not eliminated during this first step are then categorized as either active or inactive. The vulnerability assessment for active tanks is the responsibility of the owner/operator. The owner reviews its tank operating procedures to determine if a potential hazard exists and takes appropriate actions to ensure any hazards are adequately analyzed and controlled.

For inactive tanks, a team of experts from various site organizations performs follow-on actions to determine if potential hazards exist. The next step in the process is to gather additional information on the inactive tanks to complete the hazard assessment. The remaining inactive tanks are screened again using the hazard criteria checklist. Inactive tanks requiring additional evaluation may be inspected and sampled if necessary. Information obtained during the tank inspections is re-evaluated against the hazard screening criteria to determine if a vulnerability exists. Corrective actions are taken to ensure any hazards are adequately analyzed and controlled. A flow chart of the waste storage tank vulnerability assessment is shown in Figure 1.

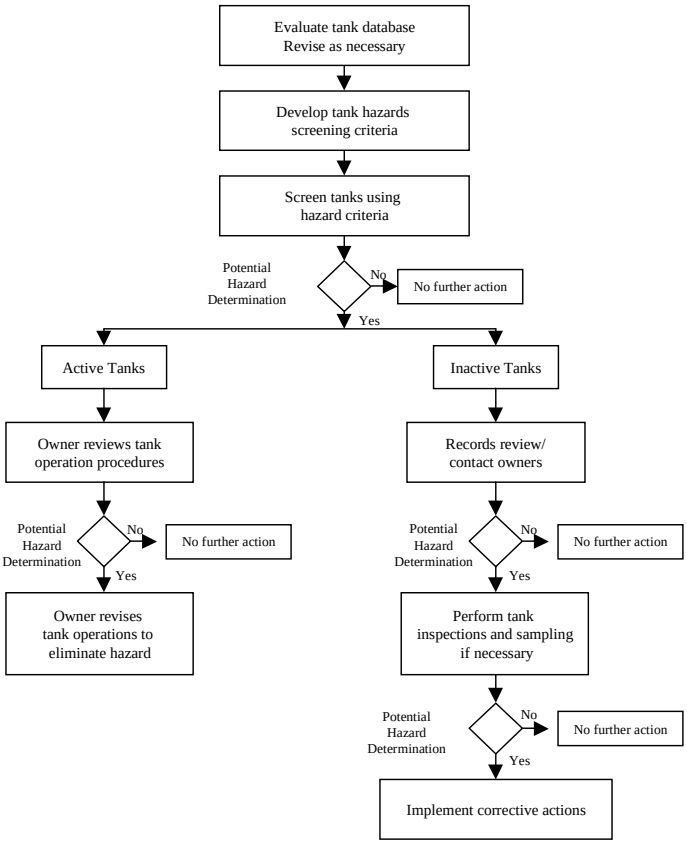

Fig. 1. Waste Storage Tank Vulnerability Assessment Flow Chart

3.8 OBSERVATIONS AND POTENTIAL VULNERABILITIES

This section addresses observations and potential vulnerabilities requiring corrective actions that were identified during this assessment. Numerous management systems and programs, as discussed in this report, are used to address many of these observations and potential vulnerabilities on an ongoing basis. The following definitions are used.

Observation: An observed condition or deficiency relative to existing management systems or programs that requires corrective actions but is unlikely to lead to a serious health, safety, or environmental impact.

Potential Vulnerability: An observed condition or uncertainty that, left uncorrected, may create the potential for a fire, explosion, nuclear criticality, serious injury to an employee or release of toxic material to the environment in significant quantities.

Observations and potential vulnerabilities are grouped into similar generic vulnerability categories as identified in the Comprehensive Site Response Plans to the Chemical Safety Vulnerability Working Group Report, dated October 25, 1995. Three potential vulnerabilities and eight observations were identified.

Corrective actions for these observations and potential vulnerabilities are summarized in this section. Based on the results of the identified corrective actions, additional corrective actions may be necessary. Funding for any additional corrective actions may need to be requested based upon ranking by risk, prioritization, and a cost-benefit and risk analysis.

3.8.1 Inventory Control and Tracking

Observation 1: Organizational designations and custodial information for HMIS have become outdated as a result of reorganizations.

Action: Update the organizational designation and custodial information for each HMIS storage area by providing current information to the HMIS Program Manager.

Responsible Organization/Manager: Managers of all divisions with HMIS-registered storage areas/L. W. Long

Observation 2: HMIS is not being properly updated to reflect transactions from the ETTP Property and Materials Management System.

Action: Resolve the interface problem between the Materials Management System and HMIS and reconcile any remaining inventory differences.

Responsible Organization/Manager: Property and Materials Management, in coordination with the HMIS program office/R.F. Cox.

Observation 3: A total of 245 hazardous material control areas are registered at ETTP.

Action: Evaluate elimination and consolidation of hazardous material storage areas where possible. Care should be taken to balance elimination and consolidation of control areas so that additional hazards (e.g., storage of incompatible materials; an increase in inventory subject to a common initiating event) are not created.

Responsible Organization/Manager: Managers of all divisions with HMIS-registered storage areas/L. W. Long

Observation 4: A more thorough review is needed of the data and information generated during facility walkdowns to ensure that (1) materials are properly tracked and managed and (2) no additional vulnerabilities exist.

Action: (1) Complete review of the unlisted and residual chemicals and materials identified during the facility walkdowns for any safety and environmental concerns, (2) make recommendations for inventory tracking and/or other disposition, and (3) ensure that all materials are appropriately included in safety documentation.

Responsible Organization/Manager: Chemical Safety Review Team/J. Bradbury

3.8.2 Characterization of Chemicals, Waste, and Materials

Potential Vulnerability 1: Historic characterization data for certain legacy waste streams and materials may not be adequate to assess material and/or container compatibility.

This potential vulnerability could lead to overpressurization of containers, chemical reactions, and leaking containers. Mitigating actions and systems to minimize the likelihood of this potential vulnerability are discussed in Sect. 3. In addition, the following specific actions are proposed or are underway:

Action: As part of ETTP's response to the Paducah incident involving overpacks and incompatible waste, a detailed evaluation is underway. The assessment plan for conducting this evaluation is described in Appendix F. The performance of these corrective actions will minimize vulnerabilities associated with stored legacy waste including material and/or container compatibility issues.

Responsibility: ETTP Operations Division/ C. H. Peterson

Action: Develop plan to sort low-level waste currently stored in B-25 boxes in K-306-3 Cold Trap Room. Properly segregate and dispose of contents. Completion of this action is subject to availability of funding.

Responsibility: Technical Services Organization/ J. L. Frazier

Action: Although significant quantities of legacy gas centrifuge enrichment program materials have been dispositioned since that program ended, some materials remain in the north end of the K-25 Building and in one of the K-27 Building vaults. Current information indicates this material is predominantly classified parts, but a complete characterization of this material has not been performed. Final characterization, risk ranking, and disposition of this material will be completed subject to budget availability.

Responsibility: Surveillance and Maintenance/C. P. Boggess

3.8.3 Chemical Storage Practices

Observation 5: Potential hazards associated with active and inactive waste storage tanks will be further evaluated as discussed in Sect. 3.7.

Action: Complete assessment of active and inactive storage tanks.

Responsible Organization/Manager: Tank Review Team/R. H. Kingrea

Action: Complete assessment of active waste storage tanks.

Responsible Organization/Manager: ETTP Operations/C. H. Peterson

Potential Vulnerability 2: Long-term storage of waste and materials in containers designed for shipping but not for long-term storage could result in (1) container aging and deterioration and (2) chemical aging and decomposition.

This potential vulnerability could lead to over pressurization of containers, chemical reactions, and leaking containers. Mitigating actions and systems to minimize the likelihood of this vulnerability are provided in Sect. 3. In addition, the following specific actions are proposed or are underway:

Action: See assessment plan in Appendix F. The performance of this assessment will also minimize potential vulnerabilities associated with container aging, chemical aging, and decomposition to unknown byproducts for waste management facilities.

Responsible Organization/Manager: ETTP Operations/C. H. Peterson

Action: Repackaging of accountable lithium hydroxide is needed for some containers because storage containers are degrading with age. Repackaging of degrading containers will be completed in FY 1998.

Responsible Organization/Manager: Surveillance and Maintenance/C. P. Boggess

Potential Vulnerability 3: Catastrophic natural events could result in release of hazardous materials into the environment from waste management storage units.

Facilities currently in use to store waste are not designed to resist a current design basis accident, such as a natural phenomena event (e.g., tornado, seismic event, etc.). A natural phenomena event could result in the release of hazardous chemicals to the environment or cause potential on-site exposures.

Action: Complete remaining Operation Division's SARUP activities: (1) complete the remaining safety documentation for waste storage facilities and (2) obtain DOE approvals for all safety documents submitted.

Action: Review the results of SARUP to identify feasible safety features that might be added to or incorporated into the operations of a hazardous waste storage facilities. The safety features, if funded, would be used to help offset or minimize the consequences of a natural phenomena event in a hazardous waste storage facility.

Action: Use the results of SARUP to identify waste streams that are at high-risk due to a natural phenomena event. Rank by risk hazardous waste storage facilities for the purpose of scheduling and funding of activities to reduce the amount of high-risk waste in storage, or the resistance of a facility to releases that could be caused by natural phenomena.

Responsible Organization/Manager: ETTP Operations/C. H. Peterson

3.8.4 Condition of Facilities and Safety Systems

Observation 6: Condition assessment surveys described in Sect. 3.5.2 have been completed for 33 buildings in the Surveillance and Maintenance Program. Fifty-five additional buildings require similar assessments.

Action: Conduct condition assessment surveys on the remaining 55 buildings.

Responsible Organization/Manager: Surveillance and Maintenance/C. P. Boggess

3.8.5 Planning for Disposition of Chemicals and Materials

Observation 7: Some compressed gas cylinders on site do not have a documented use for the short-term. Site policy or guidance is needed to reduce the number of high-pressure cylinders and ensure proper management of those that cannot be emptied or returned to vendors.

Action: Prepare ETTP policy or guidance relative to use, management, emptying, or disposal of compressed gas in cylinders.

Responsible Organization/Manager: Property and Materials/R. F. Cox

Observation 8: Legacy materials stored in Vault 7A require evaluation for further use and/or disposition.

Action: Develop plan for addressing legacy materials found in Vault 7A. Completion of this action is subject to availability of funding.

Responsible Organization/Manager: Technical Services Organization/J. L. Frazier

4. KNOWN VULNERABILITIES

This chapter responds to the second initiative addressed in the August 4, 1997, directive from Secretary Federico Peña, which reads as follows:

> *DOE field offices must reassess known vulnerabilities (chemical and radiological) at facilities that have been shutdown, are in standby, are being deactivated, or have otherwise changed their conventional mode of operation in the last several years, and report status to their Program Secretarial Officers and Assistant Secretary for Environment, Safety, and Health within 120 days. Facility operators must evaluate their facilities and operations for new vulnerabilities on a continuing basis.*

4.1 STATUS OF KNOWN VULNERABILITIES

A report that addresses the status of known vulnerabilities is included in Appendix G. A copy of this report was provided to the ETTP DOE Site Office on November 14, 1997.

4.2 PROCESS FOR EVALUATING NEW VULNERABILITIES

The systems used at ETTP to identify and evaluate new vulnerabilities on an ongoing basis are consistent with the functions of ISMS. The overall site program for ISMS is described in Sect. 2. An important part of the site's ISMS Program involves adequate work planning, which is particularly applicable to the ISMS functions of defining work scope, analyzing hazards, identifying work controls, and performing work in accordance with the controls. Vulnerabilities are identified during the working planning phases of projects and activities. In addition, the detailed programs, practices, and systems discussed in Sects. 3.1 through 3.6 also identify vulnerabilities. Applicable ISMS functions for these programs and practices include analyzing hazards, identifying work controls, and performing work in accordance with the controls. The remaining ISMS function, feedback and continuous improvement, is achieved through a variety of site programs and systems discussed in this section.

Processes that identify vulnerabilities on an ongoing basis, other than those discussed above, are grouped by those that are applicable to the entire ETTP site and those that are only applicable to D&D and environmental restoration activities.

4.2.1 ETTP Site-Wide Systems

Radiological Control Surveys and Assessments

Radioactive contamination surveys are performed in certain areas on a routine basis and in other areas as requested to support projects and work activities. Surveys are also performed if radioactive contamination is suspected to be present in areas where contamination was not previously known to be present. Radiological control surveys are limited to radioactive contamination and materials, and to a lesser extent for ETTP, radiation. Self-assessments are performed on a daily, weekly, and quarterly basis as prescribed by Procedure RCO-AD-400.

Results are documented on Radiological Awareness Reports and Radiological Deficiency Reports.

Annual LMES Integrated Audits

LMES performs annual integrated audits, which consist of subteams addressing management and quality, safety and health, and environmental protection issues. The audit subteams are made up of subject matter experts from other LMES sites and central staff who perform in-depth reviews of processes and field conditions with an emphasis on safety, health, and environmental protection. Audit findings, including those that identify vulnerabilities, are addressed in the issues management system and tracked until corrected.

Corporate Environment, Safety, Health, and Quality Assurance Audits

Every 3 years, a Lockheed Martin Corporation Environment, Safety, Health, and Quality Assurance audit is performed by a team of subject matter experts from sites across the country. It is anticipated that the M&I contractor will perform similar audits. The emphasis of these audits is on safety, health, and environmental protection in the work place and compliance with related regulations and orders. Audit findings, including those that identify vulnerabilities, are addressed in corrective action plans approved by senior Lockheed Martin management. The findings are also placed in the issues management system and tracked until corrected.

Annual Environmental Self-Assessments

A self-assessment of ETTP is performed by the Environmental Compliance organization annually. Included in the self-assessment are activities conducted throughout the year, such as

- RCRA satellite and 90-day accumulation area assessments,
- PCB storage areas assessments,
- Clean Air Act assessments, and
- Clean Water Act assessments.

Internal Independent Audits

A series of audits of site activities, including those related to vulnerability identification and correction, are performed each year, independent of the management self-assessments. The audits are performed by trained auditors, using checklists based on regulations and requirements. As with other audits, the findings are placed in the issues management system and tracked until corrected.

Facility Excellence Walkdowns

The Facility Excellence Program involves weekly walkdowns of selected facilities to assess ES&H concerns and general facility conditions. Walkdown teams include senior and line management, facility operators, workers, and ES&H professionals. The facilities are rated on a scale by the walkdown teams. The program promotes continued awareness of facility conditions

by building operators and occupants. Any concerns regarding hazardous/radioactive materials and wastes are identified by the walkdown teams as part of the overall ES&H assessments.

Fire Protection Evaluations and Audits

The ETTP Fire Protection Engineering Department prepares engineering surveys of most major buildings on the site. These surveys involve walkdowns of the building by a qualified fire protection engineer, analysis of the building for compliance with relevant fire codes and standards, and preparation of a report that includes building description, identification of building occupancy, analysis of life safety considerations, a fire risk analysis, and findings and recommendations.

The Fire Protection Program management staff performs walkdowns of each in-use building at ETTP once a month. The walkdowns identify dangerous accumulations of combustibles, blocked exits, and impaired or missing fire-related equipment.

"I Care—We Care System"—Safety and Health Concerns

The "I Care—We Care" System form is used for employees to express concerns that may have a direct impact on the safety and health of LMES employees, subcontract employees, or the public. Two primary issues associated with employee feedback are

- creating and maintaining an environment in which workers feel comfortable providing feedback on potential safety issues, and

- capturing precursor and near-miss information and disseminating it in a usable form to personnel needing that information.

Line/Facility Self-Assessment

Line management has the primary responsibility for implementing an effective, ongoing self-assessment program that ensures participation by their employees as well as all levels of management within their organization. The self-assessment process is the upper-tier process for which all other processes for identifying vulnerabilities are integral parts. The chemical and radiological hazards associated with the operation or facility are well known to the line/facility manager and form the basis for the operating procedures and SAB documents. Line and facility management are the logical point for the planning and implementation of effective self-assessment programs, because they possess the operation and facility expertise.

Nuclear Material Control & Accountability Audits

Comprehensive internal audits of each Nuclear Material Control and Accountability (NMCA) program element are conducted to assure the effectiveness of the implementation of the NMCA program. Audit frequency is established by DOE requirements, based on the category of nuclear material within the Material Balance Area.

Facility Verification Program

Site facilities are reviewed periodically by facility safety engineers and facility operators to confirm that SAB documents remain accurate. Facilities are prioritized for verification by the Installation Facility Safety Manager, accounting for hazard classification, use, reindustrialization needs, and specific requests. Checklists are used by the reviewers to ensure that key features of the SAB are addressed during facility walkdowns. When possible, walkdowns are scheduled with other review activities, such as Facility Excellence Inspections. Results of the verifications are reported to the DOE Site Office, the organization manager and facility operator, Emergency Preparedness/Response personnel, and Safety Analysis personnel. If discrepancies are noted, the facility operator is made aware, and the report will contain recommendations, such as initiation of a USQD, to restore the validity of the SAB.

Since the program began in early 1996, 45 verifications have been completed. All nuclear and hazardous facilities have either been reviewed at least once or are scheduled for review by the end of calendar year 1997 except for the UF_6 Cylinder Yards, Building K-29, and Building K-31. Of the 45 completed verifications, most facilities were confirmed to remain within their documented safety basis, but three resulted in recommendations that a USQD be initiated to restore accuracy of the safety basis. One resulted in a new PHS document. Six verifications resolved questions about chemical inventories and recommended updates to SABs to show reduction of hazardous conditions. Also, prior to leasing a facility to CROET for sublease to a private company, a facility verification is performed and the results provided to LMES reindustrialization account executives for communication to prospective lessees, confirming the status of the hazards and controls described in the safety basis document.

Emergency Planning Exercises

ETTP participates in the annual ORR Full-Participation Exercise and performs self-assessments during site-wide drills. Each drill and exercise, noted in the *ETTP Emergency Plan* K/SS-586, is subject to an activity critique for vulnerabilities and areas for improvement. The results of exercises and drills are documented in exercise reports. Subjects for exercises and drills are the materials having the greatest potential for off-site impacts. The focus of previous drills on chlorine and ammonia has driven the real operations to reduce or eliminate the real inventories so that they are no longer of top concern. Recent priority drills have emphasized a fire involving waste PCB storage.

Price-Anderson Amendments Act Noncompliance Reporting Process

ETTP's philosophy of self-reporting is a well-established tradition in the site culture. This cultural principle has been effectively integrated into the Price-Anderson Amendments Act (PAAA) Noncompliance Reporting Process. The process is directed toward Category 2 and 3 site activities (ETTP has no Category 1 facilities) and radiological facilities. The ETTP PAAA Process is described in NS-120, *PAAA Noncompliance Determination Process*.

SHERC Reviews

SHERC is composed of subject matter experts from the safety, health, environmental, and quality disciplines, including criticality safety, fire protection, etc. Changes to safety-basis documents and project plans for major decommissioning and environmental restoration projects are reviewed by SHERC to provide verification that applicable hazards and vulnerabilities have been identified and mitigated.

Critiques of Events

Reported unusual events are evaluated using a structured critique process led by a trained facilitator. The process is designed to gather facts concerning the event and determine the cause or causes including the identification of any vulnerabilities that may be present and may have contributed to the event.

S&M Routine Surveillances

Facilities that are declared in the S&M Program while awaiting decontamination, demolition, and environmental restoration periodically undergo surveillance inspections to determine facility conditions. These inspections identify vulnerabilities related to deteriorating conditions.

DOE Voluntary Protection Program

ETTP is a participant in the DOE VPP competition, requiring a comprehensive self-assessment of safety programs and processes relative to the DOE VPP criteria. The VPP requires a thorough review and reporting of DOE and operating contractor site management accountability and program evaluations and their commitment to the principles of compliance with occupational safety and health policies, goals, and objectives. Participation requires effective employee involvement, work site analysis, hazard prevention and control, safety and health training for both supervisors and employees, and assurances of commitment by both union and management. Participation in the VPP assures management commitment and employee participation for an overall positive effect, helping achieve effective implementation of a viable safety and health program across ETTP.

4.2.2 Decontamination and Environmental Restoration Activities

Project Plans

Project plans are prepared for major D&D and environmental restoration projects. These plans address all aspects of the project, including safety and health of workers while performing the work. The plans may reference and use existing safety basis documentation or specially prepared safety and health plans.

Project Health and Safety Plans

For major D&D and environmental restoration projects, separate safety and health plans are prepared. These plans identify vulnerabilities and the measures that will be used to mitigate the vulnerabilities.

Operational Readiness Reviews

Major D&D and environmental restoration projects, such as the Deposit Removal Project, receive comprehensive operational readiness reviews. These reviews involve multiple levels of Energy Systems and DOE management. The reviews include adequacy of safety and health planning and implementation of the mitigation actions identified in the plans. Less hazardous projects receive a readiness assessment with fewer levels of review.

4.2.3 Related Programs and Processes

The assessment, identification and tracking of vulnerabilities is managed using the dual processes of assessing ongoing programs and managing identified deficiencies. A formal self-assessment of ongoing programs identifies continuous improvement and includes site participation in the DOE VPP. Formal assessment programs, such as appraisals, audits, and surveillances, are used to monitor activities and provide an independent perspective in identifying vulnerabilities as issues for resolution. Each issue requires the development of corrective actions, which are tracked to completion in the Energy Systems Action Management System (ESAMS).

Issues Management Process

Issues management begins with the recognition and identification of an issue and ends with a permanent solution to the identified issue. “Issue” is a generic term for problems, deficiencies, findings, concerns, alerts, recommendations, observations, and other conditions requiring evaluation for corrective action. Elements of the Issues Management Process are identification of issues, grouping and prioritization of issues, planning of actions, performing and monitoring of actions, and verification of effectiveness.

ESAMS

ETTP is an active participant in the ORR-wide issues management systems. ESAMS is a computer-based program that ensures commitment to action by tracking completion dates, issuing automatic reminders, and reporting to management on delinquent action completions. Issue actions to be entered into the system come from audits, evaluations, as-found conditions, reviews and deficiency reporting activities. Other proactive processes, such as the USQD Program and event critiques, may also require actions, which are then entered into the issues management database. Over 200 issues and corrective actions were opened in ESAMS management system in FY 1997. This demonstrates that problems and deficiencies are being found and corrected.

Occurrence Report Investigations

Occurrence notifications identified during facility operation come from incidents that occur during a planned activity, as-found activities that place the facility outside of the SAB, and conditions detected during normal site surveillance and maintenance activities. The dispositioning of occurrence notification events requires the development of corrective actions, an evaluation for root cause, and reviews for lessons learned and generic implications. These assessments go well beyond the existing condition and look at the extent of the vulnerability across the facility, site, and ORR. The Occurrence Reporting System is discussed in Sect. 6.

Lessons Learned Review and Dissemination Process

The Lessons Learned Program is a process by which successes, problems, and uncommon experiences are recorded for the future and are communicated across the company and the DOE Complex. The information disseminated comes from experiences of employees, DOE and other DOE contractors, and other government agencies and companies. This ensures a systematic and timely process of notifying various operating units if an experience is detected that could have significant adverse effects on quality, safety, the environment, or health. These reports often relate newly discovered vulnerabilities. The Lessons Learned Program is also discussed in Sect. 6.

5. TECHNICAL COMPETENCE

This chapter responds to the third initiative addressed in the August 4, 1997, directive from Secretary Federico Peña, which reads as follows:

> *DOE and contractor field organizations with operational responsibilities must assess the technical competence of their staffs to recognize the full range of hazards presented by the materials in their facilities, act on results, and implement training programs where needed.*

The cornerstone of safe operation at EMEF is the safety program, which includes the training of personnel performing the day-to-day functions. The goal of the training program is to efficiently and effectively conduct training that is directly related to day-to-day functions and meets imposed requirements to ensure that personnel are qualified.

Responsibility for the safe operation (including training) of this organization is a line-management function. EMEF is committed to achieving performance-based training. This commitment ensures that subject matter experts and facility personnel participate in the development and review of the training process.

5.1 GENERAL EMPLOYEE TRAINING

The operating organizations at EMEF facilities are responsible for implementing training and qualification programs to ensure that employees, subcontractor personnel contracted to them, and visitors for whom they are responsible receive adequate and cost-effective training commensurate with the hazard level and complexity of the operation associated with their respective job assignment. The operating organization's training staff, normally a training manager or coordinator and instructors or developers, ensure that employee training requirements are identified and documented as appropriate to their specific job. The employee's individual training program normally consists of entry-level requirements, initial job training requirements as identified in the job or task analysis or functional analysis, and continuing training requirements to maintain qualification or proficiency.

At ETTP and Portsmouth, following initial employment, personnel requiring unescorted access to the site are required to attend GET. GET programs include baseline Hazardous Materials training, baseline Hazard Communications standards training, emergency response procedures training, and employee reporting responsibilities training. This training is structured to meet the safety needs of each employee for access to the facilities. Examinations are administered following the completion of each segment of the GET program. Proficiency testing or refresher training and reexaminations are conducted every 2 years. Persons who have not completed GET or who failed the examinations are required to be under continuous escort. At Paducah, the GET program has been in effect since before the United States Enrichment Corporation transition. GET consists of five modules, four of which require a written examination. A minimum score of 80% must be achieved on each module. Upon completion of GET, the dated GET card is issued

and card holders are granted unescorted access into the facility if all security requirements have been met.

5.2 FACILITY- AND JOB-SPECIFIC TRAINING

Individual training plans are referred to as Baseline Training Requirements (BLTRs) at ETTP and Portsmouth. BLTRs are established for personnel to match the jobs they perform to the required training; this includes training on hazards they may encounter in conducting job activities. BLTRs were established based on analyses of the jobs including hazard and risk analyses. EMEF training programs at Paducah have been established and implemented for key positions to ensure that the staff at Paducah have the competence to recognize identified facility hazards and to act safely and appropriately. These training programs are defined in position-specific Training Requirements Documents. To assist the staff in accomplishing the requirements, efforts are underway to link job hazards to tasks in a database.

Job-specific training is provided to LMES personnel through courses such as Radiological Worker training, Criticality Safety training, Safety Work Permit training, etc. Facility-specific training is provided on applicable command media and hazards for specific facilities. Support personnel and visitors receive training and briefings from facility management on the hazards for the facility. Qualification of other personnel outside the scope of DOE Order 5480.20A is driven by the applicable requirement, such as RCRA, DOT, OSHA, etc.

Job-specific training is also based on applicable command media, specific facilities, and applicable environmental permits (e.g., RCRA permits). For example, job-specific training is provided to employees at TSCAI, CNF, and Transportable Vitrification System facilities; employees involved in the Deposit Removal Project; and personnel specializing in RCRA issues at Portsmouth and Waste Operator B training at Paducah. The training programs for these facilities are recorded in training program documents at the respective facilities.

The following list includes examples of training courses that are provided to EMEF personnel to satisfy the requirements of their specific jobs as identified through job and task analyses:

- The Hazard Communications training course is required for unescorted access to LMES sites for more than 10 days. (ETTP and Portsmouth)
- Hazard Communications Level 1 training is for all workers who work with hazardous chemicals. (ETTP and Portsmouth)
- Hazardous Materials (DOT HM 126F) General Awareness, Familiarization and Safety training is for workers who transport small amounts of hazardous materials not in a commercial motor vehicle or who load, store, or secure hazardous materials for transport. (ETTP and Portsmouth)
- Carcinogen Control Program Training is required for workers in a carcinogen-regulated area. (ETTP and Portsmouth)
- The Hazardous Waste Operations and Emergency Response (HAZWOPER) 24-hour training course is required for workers in waste operations at treatment, storage, and disposal facilities regulated by 40 CFR Pts 264 and 265. (All sites)

- The HAZWOPER 40-hour training course is required if the worker is directly involved in RCRA corrective actions or cleanup operations and is required to wear Level C or greater personal protective equipment. (All sites)
- Training required under RCRA permits and other environmental regulations is required for all sites.

Some operations personnel, are required to complete position-specific training. Examples of some areas that are considered are

- facility systems, components, and operations;
- ES&H orders;
- codes and standards overview;
- Safety Analysis Reports and Technical Safety Requirements;
- nuclear criticality control;
- ALARA and radioactive waste reduction program; and
- quality assurance quality control practices.

Core training, such as Radiological Worker training, Criticality Safety training, Safety Work Permit training, etc., is provided to personnel at EMEF sites.

5.3 COMPLIANCE TO DOE ORDER 5480.20A

EMEF has DOE–approved Training Implementation Matrices based on DOE Order 5480.20A. The current training processes and content reflect WSSs.

5.4 CHEMICAL HAZARDS TRAINING

EMEF personnel are trained in hazard control methods such as the hazard diamond, response to emergencies, and use of MSDS. Personnel working with chemicals are trained in the hazard communication standards of 29 CFR 1910 and 1926. Workers working directly with chemicals are trained in the chemistry for the specific facility, including MSDS reports for that facility.

Personnel working with chemical wastes are trained to the duties of their involvement in the waste management process. Waste coordinators determine the appropriate storage disposal method, which is communicated to the workers transporting and handling waste. Workers are trained on the HAZWOPER training requirements as directed in 29 CFR 1910 and on general Hazard Communication information. Through this training, workers learn how to determine which wastes can and cannot be stored together and which wastes are compatible.

5.5 ASSESSMENT OF THE TRAINING PROGRAM

Over the past several years, DOE has conducted a series of assessments of the technical competence of contractor staff at EMEF facilities and of site training and qualification programs. The results of these and other site assessments have been addressed, as required, by implementation of corrective action plans with the objective of identifying and assigning responsibilities for training program requirements, which will ensure that personnel receive

adequate training commensurate with the hazard level and complexity of operations associated with their respective job assignment.

The following are examples of assessments:

- K-25 Training Implementation Matrix for DOE Order 5480.20, performed by the DOE Training Coordination and Assistance Program, April 11–13, 1995 (ETTP);
- K-25 Site Training Implementation Matrix Compliance, performed by LMES Quality and DOE Training Coordination and Assistance programs, January 8–19, 1996 (ETTP);
- K-25 Site Implementation of DOE Order 5480.20A, performed by DOE, April 1–15, 1996 (ETTP);
- Qualifications of Supervisors as Part of a Type A Investigation, May 1997. (ETTP);
- Tennessee Department of Environment and Conservation audits for ETTP RCRA Compliance, September 1997 (ETTP);
- Management Assessment and Environment, Safety, Health, & Quality Assurance Functional Appraisal, performed by DOE, May 10, 1995 (Paducah);
- LMES Corporate Audit, performed by LMES, November 21, 1996 (Paducah);
- Technical Audit of Training Program Elements of Personnel Selection, Qualification, and Training Requirements, performed by internal assessors, June 24, 1997 (Paducah);
- Portsmouth Training Implementation Plan for DOE Order 5480.20A, December 1995;
- DOE Approval of Training Implementation Matrix for DOE Order 5480.20A;
- Self-Assessment A97-05, Assessment of Procedures and Training, June 1997; and
- Self-Assessment A97-06, Assessment of RCRA Part B Permit Compliance, July 1997.

6. LESSONS LEARNED AND OCCURRENCE REPORTING

This chapter responds to the fourth initiative addressed in the August 4, 1997, directive from Secretary Federico Peña, which reads as follows:

> *DOE field offices must assess their site lessons learned and occurrence reporting programs to assure that (1) outgoing information is well characterized and properly summarized, and (2) incoming information is thoroughly evaluated, properly disseminated, appropriately implemented, and tracked through formal management systems.*

6.1 LESSONS LEARNED

The LMES Lessons Learned Program provides a process for identifying, disseminating, and utilizing positive and negative operating experiences that may be applicable to LMES staff. This program was implemented as a pilot in 1989 in the Engineering and Computing organizations and expanded to all areas of operation within LMES in 1991. The program was initially based on similar programs utilized within Martin Marietta (now known as Lockheed Martin) aerospace operations. The program has since been expanded and further defined based on the guidance contained in the DOE Technical Standard, DOE-STD-7501-95, *Development of DOE Lessons Learned Program*, which was issued in 1995. There are numerous other DOE Orders and guidance documents that reference lessons learned identification and utilization; however, no requirements are explicitly stated. The LMES Lessons Learned Program is defined in QA-331, *Lessons Learned Program*, and is integrated with other LMES programs, such as the Occurrence Reporting Program and Issues Management Program.

The overall objectives of the LMES Lessons Learned program are to capture and share good work practices and innovative approaches to promote repeat application, and to capture and share adverse work practices or experiences to avoid recurrence. Any LMES employee can submit information as a potential lesson learned. Additionally, several different sources of information and operating experience are reviewed and evaluated for potential lessons learned. This information is reviewed by line organizations or Lessons Learned program managers on a regular basis. Information sources include those from within LMES, across the DOE complex, and in related technical sources. Some of the primary sources reviewed include the following:

- LMES occurrence reports;
- internal operating experiences;
- daily PSS logs of events;
- employee safety and health concerns;
- I Care—We Care form submittals at ETTP;
- injury and illness reports;
- results of LMES audits, assessments, and investigations;
- results of performance improvement initiatives;
- readiness reviews;

- occurrences reported by other DOE facilities through the Occurrence Reporting and Processing System (ORPS);
- PAAA noncompliances (potential and actual);
- lessons learned issued by other DOE facilities;
- DOE Operating Experience Weekly Report;
- DOE Safety and Health Bulletins;
- DOE Safety Notices;
- DOE Chemical Safety Newsletter;
- DOE Accident Investigation reports;
- product recall notices;
- Consumer Product Safety Commission advisories;
- Underwriters Laboratories advisories; and
- Defense Nuclear Facility Safety Board trip reports.

The information collected from these reports and reviews is compiled as a potential lesson learned. This information is validated by a subject matter expert to ensure consistency with policies and procedures, to identify the target audience for the lesson, and to define any recommended or required actions. This review also results in the designation of a priority level to be assigned to the lesson. Guidance provided in the DOE Lessons Learned Technical Standard is used to assist in this determination. For those lessons learned that are determined to have required actions, documented responses may be required with the actions formally tracked. Lessons designated as “Red Alerts” are issued by LMES senior management and require responses from all LMES organizations.

Dissemination of lessons learned information is accomplished via several methods. LMES utilizes an electronic mail system as the primary method to disseminate lessons learned to all organizations. Recommendations and or requirements for actions associated with the lesson are included when the information is disseminated. This approach allows information to be disseminated in a short time and to a wide audience. A summary of all new lessons learned is also generated and disseminated as a paper bulletin on a periodic basis. LMES has also developed an Operating Experience Weekly Summary report. This report summarizes operating experiences from across the DOE complex that have potential applicability to LMES operations. The primary source of information for this review is ORPS. Both initial notification and final report information are included in this review. This report is widely disseminated across LMES as a paper bulletin.

Line organization managers are responsible for determining additional dissemination needs and use of the lessons learned information based on the applicability to their operations. Feedback indicates that this information is forwarded primarily via electronic mail and at safety and staff meeting reviews. This information is also placed in required reading folders, posted on bulletin boards, or summarized in internal memorandums. It is also incorporated into training and awareness programs and procedure revisions as applicable.

Historical lessons learned information is also maintained on the LMES internal-access Web server. Capabilities are provided to search and query historical lessons learned information. These capabilities allow users to search for information by the lesson priority, the functional

category, or through word search. Links are also provided to other sources of lessons learned and operating experience information. Access to the lessons learned information on the Web is available to any LMES employee who has access to the LMES home page. This information has recently been electronically linked to the LMES work planning processes to allow the information to be evaluated as part of the work planning process. A weakness identified in the *Type A Accident Investigation Board Report on the February 13, 1997, Welding/Cutting Fatality at the K-33 Building, K-25 Site, Oak Ridge, Tennessee* identified a need for LMES to strengthen existing work planning processes, including procedures and training, to ensure that lessons learned are integrated into work planning and communicated to all project personnel. As a result of this identified weakness, enhancements are being made to expand the querying capabilties based on work activity and hazards area categories for each lesson. In addition, identified weaknesses and lessons learned from the recent Type B investigation at the Paducah site will be incoporated into the Lessons Learned Program as appropriate.

Through October 1997, approximately 150 lessons learned have been documented and issued within LMES. LMES continues to evaluate all areas of operation for additional sources of lessons learned and to emphasize to all employees the importance of utilizing these experiences in their daily work and in their work and project planning. LMES has also been an active participant in DOE-wide initiatives associated with lessons learned programs. These initiatives have provided a forum for benchmarking lessons learned programs at other DOE facilities for incorporation into the LMES Lessons Learned Program.

6.2 OCCURRENCE REPORTING

The LMES Occurrence Reporting Program provides a process for identifying, reporting, and resolving reportable events or conditions. The LMES program is based on the requirements specified in DOE O 232.1 and DOE M 232.1-1, *Occurrence Reporting and Processing of Operations Information* and is defined in OP-301, *Occurrence Notification and Reporting*. These documents specify requirements and responsibilities of LMES staff for identification, categorization, notification, investigation, analysis, and reporting of occurrences. Additional requirements for off-site notifications are also included in these documents.

The requirements stated in OP-301, define specific responsibilities for all LMES employees to report immediately to line management or the PSS Office any actual or potential adverse event or condition. The inclusion of reporting potential adverse events or conditions ensures that determinations of reportability are made by LMES management and staff who are familiar with the criteria for categorizing occurrences. This also ensures that these situations are evaluated to determine if the potential for a near-miss occurred or if they warrant reporting as a management concern.

The categorization of these events or conditions as reportable occurrences are made based on the information available at the time they are reported. The appropriate facility manager, with the support of PSS, is responsible the categorization of the event or condition. Additional facility staff knowledgeable of the event or condition may be requested to support the facility manager in determining the categorization. If there are uncertainties surrounding the level of categorization, the occurrence is categorized at the highest level that may apply. The categorization is made

within 2 hours of the time of discovery of the event or condition. Recent changes in the interpretation of DOE requirements on the time of discovery are being incorporated into revisions to OP-301. Guidance has been provided to communicate these changes in the interim. These changes in interpretation have provided a challenge in meeting the requirements of categorization within 2 hours of the time of discovery.

OP-301 defines the requirements for notification to LMES management, DOE and other off-site agencies and organizations on reportable occurrences. Verbal notification is accomplished, when required, via a "phone bridge" involving the DOE-HQ Emergency Operations Center, the DOE-ORO Emergency Operations Center, the responsible DOE facility representative, and the responsible LMES facility manager. The LMES PSS serves as the coordinator for these notifications. Verbal notification requirements for external agencies and organizations, such as the state emergency management agency, EPA, National Response Center, local governments, local emergency planning committees, law enforcement agencies (e.g., Tennessee Highway Patrol, Federal Bureau of Investigation), and Lockheed Martin Corporation, are also defined in OP-301 and associated guidance documents.

As part of the initial evaluation of the adverse event or condition, steps are taken to secure the area and preserve any additional information as applicable. An initial review or critique to compile pertinent information is conducted as soon as possible after the event or condition is reported. This information is utilized to compile the Notification Report. The Notification Report is transmitted to ORPS by the end of the next business day (not to exceed 80 hours). Information is also captured in ESAMS to track follow-up actions and responsibilities associated with resolution of the occurrence.

Follow-up or evaluation of events or conditions that are determined not to be reportable occurrences may be conducted. This determination is made by the facility manager. This follow-up may identify the need for additional actions or development of lessons learned.

Investigation of occurrences is the responsibility of the facility manager, who has several different resources available to assist them in conducting the investigation. The facility manager uses a graded approach in conducting the investigation. The manager may choose to conduct the investigation internally or may form a team of subject matter experts to aid in the investigation and analysis of the event. The analysis of the occurrence determines the direct, contributing, and root causes; the corrective actions; and any lessons learned associated with the event or condition. The root cause analysis may be accomplished by a variety of techniques depending on the complexity or safety significance of the event or condition. Several procedures exist within LMES to further define requirements in these areas, such as QA-312, *Issues Management Program*; QA-331, *Lessons Learned Program*; and QA-16.2, *Root Cause Analysis*. The results of this investigation and analysis are compiled in the Final Report, which is transmitted to ORPS. The Final Report and associated corrective actions are also captured in ESAMS to support internal tracking and trending needs.

Dissemination of occurrence information across LMES is accomplished through several methods. On a daily basis, a summary of all new occurrences across the DOE complex is routed electronically across LMES. LMES has also developed an Operating Experience Weekly

Summary report. This document includes information on all LMES occurrences and occurrences at other DOE facilities that are potentially applicable to LMES operations. Information from both Notification and Final reports are included in this report. This report is widely disseminated across LMES as a paper bulletin. Feedback indicates that it used in safety meetings, pre-job briefings, and posted in work areas.

Formal training for LMES personnel concerning occurrence reporting consists of three specific courses: (1) Introduction to Occurrence Reporting, which covers the categorization criteria, the overall occurrence reporting process, and roles and responsibilities; (2) Preparation of Occurrence Reports, which covers the format of the DOE Occurrence Report and techniques for writing quality reports; and (3) Investigation Techniques, which covers best practices for investigating occurrences, interviewing skills, conducting critiques, and evidence gathering. Additional courses are also offered within LMES on Accident Investigation Techniques (DOE-led course), root cause analysis techniques (e.g., TapRoot), and corrective action planning.

DOE-ORO recently conducted a For Cause Review of the Occurrence Reporting Program at LMES Oak Ridge facilities. This review identified areas for improvement in some areas at LMES facilities related to submittal of occurrence report information. Initiatives have begun to address these concerns. Metrics have been established to monitor progress in this area. Progress on these initiatives will also be periodically reported to DOE-ORO. This review also cited a DOE-wide problem related to reporting of near-miss events. LMES staff will be participating in a forum on this topic at an upcoming DOE-wide Occurrence Reporting meeting. Additional guidance is also being developed for incorporation in revisions to OP-301.

Appendix A

SUMMARY OF RELEVANT LOCKHEED MARTIN ENERGY SYSTEMS AND EAST TENNESSEE TECHNOLOGY PARK PROCEDURES

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A.1 ENVIRONMENTAL PROTECTION - ENERGY SYSTEMS PROCEDURES

EP-501PD, *Toxic Substances Control Act (TSCA) Compliance Program (5/97)*

It is the policy of Lockheed Martin Energy Systems, Inc. (Energy Systems), to maintain an effective program to fully comply with all applicable sections of the Toxic Substances Control Act (TSCA). This program description provides Energy Systems personnel with guidelines for ensuring compliance with sections 4 (test data), 5 (premanufacture notices and significant new use requirements), 8 (reporting and recordkeeping requirements), 12 (exports), and 13 (imports).

TSCA section 6 [polychlorinated biphenyls (PCBs)] is addressed in Energy Systems standard ESS-EP-125, *Management of Polychlorinated Biphenyls (PCBs)*.

ESS-EP-125, *Management of Polychlorinated Biphenyls (PCBs) (11/96)*

This standard establishes the requirements for ensuring compliance with PCB regulations under Title 40 CFR 761, applicable state and local regulations for PCBs, for minimizing the risk of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and for minimizing civil liabilities.

ESS-EP-126, *Spill Prevention, Control, and Countermeasures Program (2/92)*

This standard defines the administrative control program established within Energy Systems to ensure that a spill prevention, control, and countermeasures program is developed and implemented in accordance with applicable federal and state regulatory requirements to prevent or minimize the potential for the discharge of harmful quantities of oil into waters of the United States or on adjoining shorelines.

ESS-EP-128, *Reporting Continuous Release(s) of Hazardous Substances (3/93)*

This standard identifies the requirements for reporting continuous releases of hazardous substances in compliance CERCLA.

ESS-EP-129, *Stratospheric Ozone Protection Program (3/93)*

This standard defines the Administrative Control Program established within Energy Systems to ensure compliance with the Stratospheric Ozone Protection provisions of the Clean Air Act Amendments of 1990 and to enhance planning to phase-out use of all ozone-depleting substances.

ESS-EP-136, ***Resource Conservation and Recovery Act (RCRA) and Mixed Waste Program Management (12/92)***

This standard defines the administrative control program that ensures that Energy Systems, in its role as RCRA cooperator, maintains compliance with the letter and spirit of all RCRA rules and permit conditions.

EP-137,*Pollution Prevention (10/94)*

This procedure defines the responsibilities of the various Energy Systems organizations and sites for implementing a comprehensive pollution prevention program to minimize the toxicity and quantity of all wastes and pollutants to all media (air, water, and land), support resource and energy conservation, and implement recycling and affirmative procurement of recycled materials.

EP-153, *Identification and Reporting of Environmental Noncompliances (11/96)*

This procedure establishes the roles, responsibilities, and action steps necessary to identify, report, track, correct, validate, and verify closure of environmental noncompliance issues. This procedure supplements emergency reporting and response procedures and regulatory reporting requirements; it does not replace them.

ESP-EP-163, *National Environmental Policy Act Review and Compliance (5/92)*

This procedure establishes administrative controls and provides requirements for project reviews and compliance with the National Environmental Policy Act (NEPA).

EP-710, *Waste Certification Requirements for Energy Systems Waste Management Organization (ESWMO) (4/95)*

This procedure provides the required actions for certifying wastes to be managed by the Energy Systems Waste Management Organization against the requirements in ES/WM-10, *Waste Acceptance Criteria for the Oak Ridge Reservation.*

ESH-19, *Commercial Management of Hazardous Materials/Wastes (5/88)*

It is the policy of Energy Systems to utilize commercial firms for the off-site treatment/disposal of hazardous materials/wastes when (1) suitable on-site facilities are not available or (2) off-site facilities offer a determined economic advantage. All actions will be in accordance with regulations promulgated under RCRA and DOE Orders. All off-site waste management activities will be with firms that are licensed by federal and/or state regulatory authorities to manage the type materials or wastes under consideration.

ESS-ESH-901, ***Management of Medical Wastes (5/91)***

The purpose of this procedure is to ensure that regulated medical wastes, as defined herein, are managed in a manner that protects the health and safety of employees and the public and to protect the environment consistent with federal and state laws and regulations. Although the "universal precautions" concept stresses that all wastes generated through the examination or treatment of all patients is assumed infectious (for the human immunodeficiency virus or other bloodborne pathogens, such as hepatitis B virus), this standard also assumes that these waste materials are properly managed at the generating source to preclude the inadvertent exposure of Waste Management personnel.

A.2 ENVIRONMENTAL PROTECTION - SITE LEVEL PROCEDURES

SPP-4009, ***National Environmental Policy Act (NEPA) Implementation***

This procedure describes the process involved in implementing NEPA at ETTP. The intent is to ensure that potential environmental impacts of proposed actions are evaluated to support preparation of documentation required by the Department of Energy (DOE).

SPP-4013, ***Waste Site Identification and Characterization***

This procedure provides guidance for the initial identification and characterization of previously unidentified waste sites to determine responsibility for required actions in accordance with all environmental permits, laws, and regulations, including DOE Orders, Environmental Protection Agency regulations, state and local regulations, and Energy Systems policies, standards, procedures, and instructions.

SPP-4014, ***K-25 Site Resource Conservation and Recovery Act (RCRA) Permits Management***

This standard practice procedure (SPP) addresses the management of RCRA permits and describes the roles and responsibilities for compliance with RCRA and State of Tennessee hazardous waste management regulations for permitted hazardous waste management units at ETTP.

SPP-4016, ***Stratospheric Ozone Protection***

Section 608 of Title VI of the Clean Air Act Amendments (CAAAs) of 1990, prohibits the intentional venting or knowing release to the environment of any regulated ozone-depleting substance. This procedure defines the minimum requirements and work practices necessary to ensure compliance with 40 CFR 82, Protection of Stratospheric Ozone, promulgated pursuant to Title VI of the CAAA.

SPP-4111, *Hazardous Material Storage and Inspection*

This procedure provides management guidelines for storage and inspection of toxic and hazardous materials as part of a comprehensive hazardous materials management (HMM) program.

In addition, this standard practice procedure (SPP) is designed to (1) ensure compliance with all DOE, federal, state, and Energy Systems regulations, orders, policies, and standards concerning hazardous materials storage and control; (2) minimize the potential for chemical exposure in the work place, the surrounding community, and the environment; (3) support hazard minimization and spill prevention; and (4) minimize the risk of such storage from fire. To meet these goals, this SPP establishes systematic guidelines for management of hazardous materials, including those for the following aspects:

- general storage,
- hazard specific storage,
- aboveground tank storage,
- secondary containment,
- inspection/testing criteria and schedules,
- inspection checklists,
- inventory/usage reporting, and
- record keeping and documentation.

SPP-4600, *Identification of Excess/Surplus Materials and Wastes*

This procedure provides requirements for evaluating excess or surplus materials and wastes to properly identify them. Once materials and wastes are properly identified, the user is referred to the following guidance for the additional and specific requirements necessary for compliant accumulation and packaging of the materials and wastes for transfer to the receiving organization:

- SPP-4603, *Requirements for Low-Level Radioactive Wastes (LLW), Resource Conservation and Recovery Act (RCRA) Hazardous Wastes, and Polychlorinated Biphenyl (PCB) Wastes;*
- SPP-4605, *Requirements for Recycling*;
- SPP-4608, *Requirements for Conventional Wastes*;
- SPP-8751, *Release of Excess Equipment and/or Material*; and
- Oak Ridge Reservation Swap Shop.

SPP-4603, *Requirements for Low-Level Radioactive Wastes (LLW), Resource Conservation and Recovery Act (RCRA) Hazardous Wastes, and Polychlorinated Biphenyl (PCB) Wastes*

This procedure provides requirements for waste generators to accumulate (stage and store) and effect transfer of low-level radioactive waste, RCRA hazardous waste, PCB waste, and PCB-detectable waste (or any combination) to the ETTP Waste Management Division in a safe, efficient, and environmentally acceptable manner that complies with applicable federal and state regulations, DOE Orders, and Energy Systems, policies and procedures.

This procedure implements the requirements of EP-710, *Waste Certification Requirements for Energy Systems Waste Management Organization (ESWMO)*, by referring the generator to their waste certification procedure (WCP). WCPs require that waste be certified by the requirements of ES/WM-10, *Waste Acceptance Criteria for the K-25 Site and Oak Ridge Y-12 Plant.*

SPP-4605*, Requirements for Recycling*

This procedure provides requirements for ETTP personnel to recycle materials. In accordance with the Pollution Prevention Act of 1990, Executive Order 12873, and DOE Order 5400.1, *General Environmental Protection Program*, recycling is not only encouraged, it is required to the greatest extent reasonable.

SPP-4612*, Pollution Prevention Program*

This procedure establishes administrative controls, defines responsibilities, and includes requirements for implementing a comprehensive pollution prevention program to provide awareness and to minimize the toxicity and quantity of all wastes and pollutants released to all areas of the environment (air, water, and land).

A.3 HEALTH AND SAFETY – ENERGY SYSTEMS PROCEDURES

SH-120PD, *Safety Work Controls Program*

This Energy Systems program description describes the overall processes that are to be applied to identify hazards and ensure that appropriate safety and health protection is integrated into work at the task or activity level.

SH-132PD, *Hazardous Chemicals in Laboratories*

The requirements in this program description apply to the use of hazardous chemicals in laboratories on a laboratory scale whenever such use offers a reasonable potential for employee exposure. All employees, contractors, and visitors to DOE laboratory facilities operated by Energy Systems are included under the requirements of this program description.

SH-140PD, *Lockheed Martin Energy Systems Hazard Communication Program*

The Energy Systems Hazard Communication Program applies to all Energy Systems employees and construction/service subcontractors who may be exposed to hazardous chemicals under normal conditions of use or in a foreseeable emergency. The Energy Systems Hazard Communication Program Description applies to all hazardous chemicals used at Energy Systems

facilities, including hazardous chemicals procured and generated in the workplace, and consumer products used in quantities that exceed those of an average consumer.

The Energy Systems Hazard Communication Program Description outlines methods for communicating the potential hazards of chemicals used in the workplace to workers. These methods include employee training, container labeling, and use of Material Safety Data Sheets (MSDSs).

Awareness level hazard communication training is provided for all Energy Systems employees, service subcontractors, and visitors during General Employee Training. Additional hazard communication training (Hazard Communication Level I) is provided based upon the potential for exposure to hazardous chemicals. Work area (job-specific) hazard communication training is provided by the responsible supervisor upon the employee's initial entry into the work area and whenever a new hazard is introduced into the work area.

SH-161PD, ***Hazardous Waste Operations and Emergency Response (HAZWOPER)***

This program description describes Energy Systems actions and responsibilities needed to provide safety and health protection for individuals involved in HAZWOPER activities within the scope of 29 CFR 1910.120 and 29 CFR 1926.65

ESP-ESH-16, ***Hazardous Materials Inventory Program***

This procedure describes the process by which Energy Systems will provide control for hazardous materials. The Hazardous Inventory Program, which is consistent with Corporate and DOE policy and meets federal, state, and local regulations, will be maintained to provide the proper controls. The objectives of the Hazardous Materials Inventory Program are to accomplish the following:

- ensure compliance with all DOE, federal, state, and Energy Systems hazardous materials inventory regulations, orders, policies, and standards;
- minimize the potential for chemically related damage, illnesses and/or injuries in the work place and the surrounding community;
- support complimentary programs such as hazardous material transportation, hazard communication, safety, emergency preparedness, industrial hygiene, environmental compliance, non-radioactive as low as reasonably achievable (ALARA), and waste minimization;
- support optimization of hazardous materials inventory levels; and
- provide within Energy Systems a comprehensive, economical, and reliable Hazardous Materials Inventory Program strategy while minimizing the negative impact on production and research operations.

SPP-5767, *Hazardous Materials Information System*

This procedure describes ETTP's Hazardous Materials Information System (HMIS) and establishes the responsibilities that will provide for the control of hazardous materials in accordance with the Hazardous Materials Inventory Program (ESP-ESH-16) established by Energy Systems at ETTP.

The main purpose of HMIS is to unify and automate the tracking and control of hazardous materials and to unify the MSDS system with the systems that work to control the purchase of and track the use of hazardous materials. The Energy Systems' HMIS coordinates the efforts of individual installations in hazardous materials characterization, definition, tracking, and reporting processes.

SH-118INS, *Job Hazard Analysis*

This work instruction outlines uniform methods for the conduct of a job hazard analysis (JHA). This instruction applies to Energy Systems. A JHA is one of the many available ways to identify the hazards of a job and specify control measures. The JHA method outlined in this instruction is a good tool when a detailed, step-by-step analysis is needed.

A.4 OTHER ENERGY SYSTEMS AND SITE-LEVEL PROCEDURES

FS-101PD, *Facility Safety Program*

This program description presents the fundamental elements of the Energy Systems Facility Safety Program. Responsibilities of key personnel and organizations are delineated. These include the Director of Nuclear Safety, business unit managers, line managers, Central Engineering Services, Evaluations and Quality organizations, the Installation Facility Safety Manager (IFSM), independent review committees, and the general plant population. Key terms applied in Facility Safety are defined in this document.

FS-102, *Unreviewed Safety Question Determinations*

Once the operational boundaries and requirements are established by safety authorization basis (SAB) documents, the facility, operation, or process should be maintained and operated within those boundaries and requirements. Any changes to the facility, operation, or process must be evaluated to ensure that the change cannot introduce a new hazard or increase the consequences or likelihood of previously identified hazard. Conditions or properties of the facility, operation, or process which have not been identified and analyzed in SAB documents are called "as-found conditions" or "as-found properties." These "as-found" conditions or properties must be analyzed to determine their impacts on the safety of the facility, operation, or process.

FS-102 establishes the requirements and methods for evaluating changes to facilities and as-found conditions in facilities that have been identified as "nuclear facilities" or "hazardous facilities." FS-102 provides a systematic method for evaluating new proposed activities,

processes, or situations to decide if the current authorization basis will remain valid or if DOE approval is required before making the change.

FS-103PD*, Safety Documentation*

This program description identifies the safety documentation requirements for compliance with DOE Orders 5481.1B, 5480.21, 5480.22, 5480.23, and Occupational Safety and Health Administration standard 29 CFR 1910.119. This procedure provides a description of the various types of safety documentation and brief guidance on what types of facilities, operations, or activities require safety documentation.

ESP-ESH-16, IAD*, Hazardous Materials Inventory Program*

This revision is issued as an Immediate Action Directive (IAD) to be attached to and a part of ESP-ESH-16, *Hazardous Materials Inventory System*, dated March 15, 1991. This revision included guidelines for non-Energy Systems facility involvement in the Hazardous Materials Inventory Program. If an affected organization cannot implement this IAD immediately, the affected organization shall establish an implementation plan and schedule.

SPP-5650*, Fire Protection Program*

This procedure documents the Fire Protection Program at ETTP. The purpose of the program is to meet the following objectives:

- minimize the potential for the occurrence of a fire,
- ensure that the fire does not cause an on-site or off-site release of radiological or other hazardous material that will threaten public health and safety or the environment,
- establish requirements that will provide an acceptable degree of life safety to DOE and contractor personnel and that ensure that there are no undue hazards to the public from fire and its effects in DOE facilities,
- ensure that process control and safety class equipment are not damaged by fire or related perils,
- ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and its effects, and
- ensure that property damage from fire and related perils does not exceed an acceptable level.

ESS-FP-102*, Handling Small Quantities of Flammable/Combustible Liquids (4/93)*

This standard establishes requirements for the handling and storage of small quantities of flammable and combustible liquids by Energy Systems.

FP-105PD, *Fire Protection Program (4/96)*

The Lockheed Martin Energy Systems Fire Protection Program applies to federally-owned Energy Systems operated facilities. This document provides guidance for complying with DOE Orders, criteria, guides, and mandated fire protection codes and standards. The primary purpose of the program is to prevent the occurrence of fire, minimize the potential for an unacceptable loss, and provide protection for employees, the environment, and DOE property.

FP-121, *Fire Protection Assessment Program (9/93)*

This procedure establishes requirements for conducting fire protection assessments of Energy Systems-operated facilities.

MS-102PD, *Integrated Safety Management Program*

This document describes the approach used by Energy Systems to systematically integrate safety (as used synonymously with environment, safety, and health) into management and work practices so that missions are accomplished while protecting the public, the workers, and the environment. Continued improvement of existing systems and processes provides the foundation for performing work safely at all Energy Systems work locations. The Energy Systems Integrated Safety Management System fully embodies the basic concepts of integrated safety management contained in DOE policy *Safety Management System Policy* (DOE P 450.4).

Appendix B

ADDITIONAL INFORMATION ON WASTE MANAGEMENT PRACTICES

Appendix B

ADDITIONAL INFORMATION ON WASTE MANAGEMENT PRACTICES

B.1 EXAMPLE SAFETY ENVELOPE CONTROLS

The following are examples of the controls identified in the safety envelope documents associated with waste storage units, the Central Neutralization Facility (CNF), and the Toxic Substances Control Act Incinerator (TSCAI) at East Tennessee Technology Park.

Waste Storage Units

- All waste must meet ES/WM-10, Rev. 2, *Waste Acceptance Criteria for the Oak Ridge K-25 Site and the Oak Ridge Y-12 Plant*.

- The amount and type of hazardous waste received and stored in the waste storage areas are limited by Resource Conservation and Recovery Act (RCRA) permit requirements, Nuclear Criticality Safety Approvals, Auditable Safety Analyses, Basis for Interim Operations, and the Process Safety Management Program.

- Waste containers must meet container integrity and labeling requirements.

- Container exteriors are surveyed for radioactive constituents prior to entry into a facility.

- Dikes that provide for the separation of incompatible materials are designed in accordance with RCRA permit requirements.

- Inspection of waste containers and areas subject to releases and spills are performed in accordance with the RCRA permit.

- Waste is stored in accordance with National Fire Protection Association-30.

TSCAI

- The K-1435B and four-zone K-1435C Fire Protection System shall be operable during waste storage and transfer operations.

- The total mass of the uranium 235 (U-235) isotope in all materials with a U-235 enrichment >0.93% U-235 by weight shall not exceed 350 g in either the K-1435 or K-1425 TSCAI areas.

- Waste storage tanks, waste containers, tankers within the unloading area, and interconnecting piping shall be operable (i.e., able to confine liquid, semi-solid, or solid wastes) during waste storage, tanker loading and unloading, and tank-to-tank transfer operations.

CNF

- A maximum of 99,000 kg (9,000 gal) of centrifuge sludge may be stored in the K-1310-EF 90-Day RCRA Storage Area at any one time.

- Depth of sludge in the G-4130 Sludge Thickener will be maintained below 10 ft.

- A maximum of 3000 gal of sodium hydroxide may be stored at the CNF complex, principally in Tank F-215.

B.2 CONDUCT OF OPERATIONS

Waste Management (WM) facilities use the Conduct of Operations Program to ensure safe operations in day-to-day facility activities. All work activities are performed in a controlled manner in accordance with Lockheed Martin Energy Systems procedures and applicable permit requirements, and through the use of operational procedures for routine activities and approved work instructions for non-routine activities. For work not covered by existing procedures, the Safety Work Permit Program is used to ensure that proper controls (e.g., permits for lockout/tagout, hotwork, electrical work, etc.) and proper planning and orientation have occurred.

WM facilities use a common procedure, *Configuration Change Control*, WMD-AP-1510, Rev.1, to ensure that the proper change control process is followed for operational and facility changes. The change control process ensures that changes (whether permanent or temporary, physical or operational) are properly identified, developed, technically reviewed, approved, scheduled, implemented, validated, and documented, and that all command media elements (procedures, drawings, reports, designs, etc.) affected by the change are identified and updated according to an approved change control process. Also, any changes or modifications to the facility are first evaluated using, FS-102, *Unreviewed Safety Questions Determinations*, to ensure that the proposed modifications are not introducing new hazards into the workplace.

The activities associated with WM facilities involve working with or around hazardous chemicals and processes. Site-wide programs and organizations, such as Emergency Management and Radiation Protection, are used in conjunction with WM programs and procedures to ensure that safe work practices are conducted for all activities. The Facility Safety Management Program assists in identifying and documenting the pertinent hazards for a process

or facility as well as establishing controls or operational limits to ensure safe operations. The Conduct of Training Program ensures that tasks are being performed by qualified workers and that the workers have been trained on the hazards associated with a particular work area. The Conduct of Operations Program implements safe work practices in day-to-day operations and ensures that configuration control is implemented for facility and operational changes. All of these primary and supporting programs are used to ensure that accidents, such as fires, explosions and the release of hazardous materials, do not occur at ETTP.

B.3 WASTE STORAGE TANKS - LEVEL CONTROL

CNF

Tanks located at CNF are monitored by level indicators that alarm and alert the operator at the CNF Control Room when a “high” or “low” condition occurs. There have been no occurrences where a tank level change has resulted in a reportable occurrence, such as over pressurization of waste material. When a tank level change discrepancy is identified, a visual inspection is performed (with the exception of the acid tanks) to determine if the discrepancy is a result of a process or instrumentation problem. If the evaluation indicates that a process problem exists (such as an isolation valve failure), the CNF maintenance crew is called and appropriate administrative and physical controls are put in place until the problem is resolved. Valve leaks can be determined by isolating valves using instrumentation in the control room to verify the leaking valve. If an instrumentation problem exists, CNF instrument mechanics are called to troubleshoot, repair, and recalibrate the instrument loop, and appropriate administrative controls are put in place until the problem is resolved.

TSCAI

Tanks located at the TSCAI facility contain level indicators that provide information to process control instrumentation located in the K-1435-A Control Building. The process control instrumentation is equipped with a “high” and “low” tank level indicator alarm, which alerts the operator. Tank level discrepancies may occur as a result of leaking valves or incorrect tank transfers due to errors in valving alignments. Tank level discrepancies have also been attributed to errors in level instrumentation readings.

When discrepancies occur between known transfer quantities and levels indicated by instrumentation in the control room, TSCAI instrumentation mechanics recalibrate the tank level instrumentation loop. If the instrumentation is determined to have given improper readings, then adjustments are made to tank level information based on known transfer quantities. If it is determined that instrumentation is not the source of the discrepancy, a walk through of the procedure is performed to verify valve alignments and other procedural steps were followed correctly.

Appendix C

ADDITIONAL INFORMATION ON LABORATORY PRACTICES

Appendix C

ADDITIONAL INFORMATION ON LABORATORY PRACTICES

C.1 ANALYTICAL SERVICES ORGANIZATION

C.1.1 Waste Management

Waste generated by the Analytical Services Organization (ASO) is managed in a manner that ensures compliance with federal, state, Department of Energy (DOE), and site requirements. Waste is segregated at the point of generation to ensure proper handling and disposal. Waste generated from each analytical procedure is evaluated to ensure safe and proper management and disposal. Hazards are identified and incorporated into the analytical procedure and/or the area-specific waste disposal guide (ASWDG) for the waste generated in a given laboratory. Waste streams that present unusual, potential, or imminent safety hazards are segregated or treated to remove the hazard before disposal. Methods for treatment of such wastes are identified at the point of generation and are incorporated into the procedures identified in the ASWDG. ASO has developed a Waste Management Plan (Y/DK-1090), procedures for routine wastes, and specific waste analysis plans for streams or wastes that fall outside of normal operations. In addition to site procedures and DOE orders, numerous ASO procedures and guidance documents are used to ensure compliance with health, safety, and environmental regulations.

Roles and responsibilities for line management; environment, safety, and health support personnel; and technicians are defined in ASO procedures in accordance with ASO-AP-0007, *Analytical Services Organization Procedures.* ASO technicians who generate wastes are required to characterize each waste generated by their process. ASO laboratory technicians receive training to characterize, handle, and store the wastes they generate. To ensure that laboratory personnel understand the requirements of the regulations, the ASO Compliance and Quality Support Department provides environment, safety, and health (ES&H) guidance, and assistance with characterization, handling, storage, and disposal. The ASO Waste Management group also assists in packaging, shipping, and documenting disposal of laboratory wastes. Wastes generated in the laboratory are reviewed by a waste certification officer and an environmental compliance officer before shipment out of the laboratory.

ASO evaluates hazardous properties of chemicals, including potential for change over time (e.g., shelf life, expiration date) both from a quality and safety perspective. ASO's procedure ASO-SOP-0024, *Identification and Control of Chemicals and Equipment*, lists specific requirements for shelf life of chemicals. Lacking guidance from the manufacturer, the shelf life/expiration requirements in ASO-SOP-0024 are used. Evaluation and documentation is required for the extension of shelf life or expiration dates. In addition, the ASO Chemical Hygiene Plan (ASO-

AP-0002) lists requirements for shelf life and testing of peroxidizables. Expired chemicals are characterized and disposed of according to ASO waste disposal plans and procedures.

Ongoing activities to prevent safety hazards that may result from the combination of incompatible wastes include (1) comprehensive review by ASO peers, management, and health and safety staff of revised or newly written procedures to ensure technical accuracy and attention to safety, health, and waste issues; (2) development and implementation of ASWDGs by laboratory supervisors for their areas; and (3) periodic assessment of ASWDGs and waste management practices during ASO Environmental Officer walkdowns. ASO has procedures for waste certification, Resource Conservation and Recovery Act (RCRA) waste management, and polychlorinated biphenyl (PCB) waste management; analytical procedures with specific waste disposal requirements; and ASWDGs.

Waste containers are stored by type and evaluated for bulking into larger containers. Evaluation includes, but is not limited to, process knowledge of the generator, generator waste inventory log sheets, compatibility testing, and consensus of ASO and site ES&H personnel. After evaluation, like wastes are bulked into larger containers as required by the site Waste Management organization. Each container is analyzed according to the waste acceptance criteria set forth by Lockheed Martin Energy Systems (LMES) (EP-710, ES/WM-10, and SPP-4603). All wastes generated by the laboratory are reviewed by a waste certification officer and an environmental compliance officer prior to shipment out of the laboratory. Waste that does not meet the acceptance criteria is treated according to the Waste Analysis Plan for that waste stream before it is sent for disposal.

ASO identifies unneeded excess chemicals through its self-assessment program, management walkthroughs, and evaluations of chemical inventory. The ASO Self-Assessment Program consists of a combination of assessments to ensure compliance to procedures pertaining to chemical inventories, waste disposal, and waste minimization. The team leader (usually a safety/health professional or environmental officer) assembles a team to develop a plan and conducts the assessment using a checklist developed with assistance of the team members.

Conduct of Operations requires all ASO supervisors to walk their respective areas on a monthly basis, using a checklist developed by the ASO Safety and Health. ASO tracks all deficiencies noted. Excess chemicals are assessed at the time of physical inventories, which are usually conducted by technicians in the area. In accordance with site requirements (SPP-4111), hazardous material inventories are updated and reported monthly for specified materials. Chemicals that are no longer needed and still within shelf life are offered first within ASO and then on the LMES Swap Shop. If the identified chemicals have exceeded shelf life, appropriate actions are taken to document for disposal.

C.1.2 Hazardous Materials Management

ASO has policies and programs in place for safe handling of hazardous materials, for the safe and compliant storage of those materials, and for safe and compliant disposal of hazardous chemicals and waste. As an analytical laboratory, ASO is required to operate under the requirements of 29 CFR 1910.1450, Occupational Safety and Health Act (OSHA) Occupational Exposure to Hazardous Chemicals in Laboratories. ASO has a comprehensive Chemical Hygiene Plan, ASO-AP-0002, which is implemented at all facilities operated by ASO, including the ASO off-site laboratory. The ASO Chemical Hygiene Plan meets the requirements of the performance-based OSHA standard. The ASO Chemical Hygiene Plan (1) identifies engineering controls and equipment, personal protective equipment, procedures, and work practices that are capable of protecting employees from anticipated and potential health hazards presented by hazardous chemicals used in the workplace; (2) defines chemical hygiene responsibilities for management and all ASO personnel; (3) identifies provisions for additional hazard evaluation to ensure adequate protection for personnel when working with particularly hazardous substances.

ASO maintains an inventory of its chemicals. Before a chemical is ordered, information on proper handling, storage, and disposal must be known. Before a new chemical is used in the laboratory, a manufacturer's material safety data sheet (MSDS) is obtained and made available to personnel through the LMES electronic MSDS system. If a chemical presents a hazard not already found in the laboratory, appropriate training is conducted. Labels on incoming hazardous materials are not removed or defaced. Laboratory rooms are posted with "Designated Area" signs to focus attention on the hazards of the chemicals used and stored in the room.

ASO has specified in its standard operating procedure, ASO-AP-0007, *Analytical Services Organization Procedures*, that the hazards unique to the analytical operation must be included in the "Hazards" section of the analytical procedure. In addition to referencing the ASO Chemical Hygiene Plan, the "Hazards" section must mention specific cautions for hazards unique to the given procedure, such as electrical shock, acid splash, or generation of hazardous gases or fumes requiring operation in a hood. To ensure that incompatible wastes are not mixed together, specific cautions and instructions for the management, treatment (if applicable), and disposal of waste must be given in the procedure or an ASWDG referenced in the procedure.

Section 6.6 of the ASO Chemical Hygiene Plan addresses chemical compatibility and storage. The safe storage of chemicals is important in the laboratory to prevent or minimize accidental breakage, reactions, fire, or releases to the environment. The ASO chemical storage policy is based on the J. T. Baker, Inc., color-coding system. The J. T. Baker system segregates corrosive acids and bases as well as reactives, flammables, and chemicals with health hazards. The system is designed for laboratory application and was initially implemented by Y-12 ASO in 1993. With the consolidation of ASO, full implementation was required throughout the organization in April 1997.

ASO evaluates hazardous properties of chemicals, including potential for change over time (e.g., shelf life, expiration date) from both a quality and a safety perspective. ASO-SOP-0024, *Identification and Control of Chemicals and Equipment*, lists specific requirements for shelf life of chemicals. Lacking guidance from the manufacturer, the shelf life/expiration requirements in ASO-SOP-0024 are used. Evaluation and documentation is required for the extension of shelf-life/expiration dates. In addition, the ASO Chemical Hygiene Plan (ASO-AP-0002) lists requirements for shelf life and testing of peroxidizables.

Section 5.3 of the ASO Chemical Hygiene Plan (ASO-AP-0002) addresses requirements for materials with special hazards. Included in the list of materials that require special handling procedures are explosives, pyrophorics, and peroxidizables. In compliance with LMES SH-118INS, *Job Hazard Analyses*, ASO supervisors are responsible for assembling teams to conduct analyses for (1) jobs in which workers have expressed safety and health concerns, (2) routine work where the hazards and preventive measures have not been incorporated into an approved procedure or the hazards have changed, thereby warranting reanalysis, (3) non-routine work in which there are known or potential hazards, (4) new activities that could pose a known or potential hazard, and (5) jobs with high illness/injury rates or near misses. The Job Hazard Analysis teams are comprised of ASO personnel involved in the work, supervisors, ASO's analytical subject matter experts, and ASO's safety and health professionals.

Chemical and safety controls for in-process materials are defined in analytical technical procedures. Revised or newly written procedures receive comprehensive review for technical accuracy and safety, health, and waste issues by ASO peers, management, and health and safety staff. ASO has procedures for waste certification, RCRA waste management, and PCB waste management; analytical procedures with specific waste disposal requirements; and ASWDGs. Chemical hygiene, safety, and waste management in ASO are periodically assessed. These assessments include, but are not limited to, chemical storage practices, labeling of in-process chemicals, and waste handling issues.

C.2 TECHNICAL SERVICES ORGANIZATION

C.2.1 Waste Management

The Technical Support Organization (TSO) uses and stores a variety of materials designated as chemicals. TSO performs materials characterizations, process development, and support to DOE Environmental Management and other programs. TSO-generated wastes are managed in accordance with federal, state, DOE and site requirements. Wastes are segregated at the point of generation for temporary storage. Wastes are managed in accordance with the requirements of SPP-4603, *Requirements for Low-Level Radioactive (LLW), Resource Conservation and Recovery Act (RCRA), and Polychlorinated Biphenyl (PCB) Wastes*, and SPP-4605, *Requirements for Recycling*.

The storage, use, and disposal of hazardous chemicals and materials requires the establishment of appropriate roles and responsibilities within TSO to safely manage these materials. Roles and responsibilities are included in the TSO Chemical Hygiene Plan. TSO has a chemical hygiene officer, a hazardous materials coordinator, a Safety Review Committee, an ALARA representative, and support personnel with expertise in industrial safety, radiation protection, and industrial hygiene. Principal investigators and their department managers are directly responsible for safe, compliant storage and use of chemicals and other hazardous materials under their management and supervision.

TSO self-assessment walkdowns conducted by the chemical hygiene officer and the hazardous materials coordinator serve to identify excess chemicals and deficiencies in compliance with the Chemical Hygiene Plan. Deficiencies are noted in a self-assessment report to the TSO Director and corrective actions are identified and scheduled for completion. Any corrective actions required are monitored and tracked by the Chemical Hygiene Officer.

TSO initiated an effort in calendar year 1996 to identify and eliminate obsolete or unneeded chemicals in its inventory. This effort is proceeding in accordance with the principles of As Low As Reasonably Achievable (ALARA); that is, reducing risks or exposures to personnel by eliminating or reducing potential sources of exposure or risk. A significant number of chemicals and hazardous materials have been declared excess and dispositioned as surplus or disposed of as hazardous wastes according to East Tennessee Technology Park site and LMES policies and procedures.

C.2.2 Hazardous Materials Management

Most chemicals in current use by TSO are located in Building K-1006, known as the Materials and Chemistry Laboratory. This facility is also a DOE-designated environmental services user facility, similar to user facilities at Oak Ridge National Laboratory, such as the High Temperature Materials Laboratory. Chemicals are also present in TSO laboratories and storage areas in K-1004-L, K-1004-C, K-1401, K-1037, and K-1030. Additionally, chemicals, gas cylinders, and equipment from prior TSO operations are stored in vaults 7A and 18A and the 305-2 Cold Trap Room in Building K-25. Chemicals in active TSO facilities are managed according to approved LMES and ETTP site procedures and policies. Hazardous material inventories were recently (October 1997) updated, with the inclusion of chemicals in vaults 7A, 18A, and 305-2 Cold Trap Room.

TSO operates under the requirements of 29 CFR 1910.1450, OSHA Occupational Exposure to Hazardous Chemicals in Laboratories. TSO has a current Chemical Hygiene Plan, which is reviewed and updated annually and is implemented at all TSO facilities storing or using chemicals. The Chemical Hygiene Plan meets the requirements of the OSHA standard and was developed according to OSHA guidelines and models for chemical hygiene plans. The Chemical

Hygiene Plan identifies procedures and work practices that are necessary for the protection of personnel.

TSO maintains a comprehensive and current inventory of its chemicals as stated earlier. MSDSs for all chemicals currently in the TSO inventory are made available to personnel. New operations involving hazardous chemicals are identified by the principal investigator or relevant manager and reviewed by the TSO Safety Review Committee. The TSO Safety Review Committee consists of technical experts and managers with knowledge and experience in laboratory practices and operations.

Chemicals are stored and used in TSO according to the requirements of SH-132PD, *Hazardous Chemicals in Laboratories*, and SH-140PD, *Hazardous Communication Program*. The requirements and provisions of the TSO Chemical Hygiene Plan are assessed at least annually for compliance by TSO facilities and operations. Laboratories and storage areas where hazardous chemicals are present have been assessed for chemical compatibility.

The TSO prevents safety hazards resulting from the combination of incompatible materials (including wastes) by use of the TSO Project Safety Summary for operations that are reviewed by the TSO Safety Review Committee. Incompatible materials are stored according to accepted laboratory practices and industrial laboratory guidelines. Operations involving temperature sensitive, shock sensitive, highly toxic or otherwise extremely hazardous chemicals are described in the TSO Project Safety Summary with assessment by the TSO Safety Review Committee. Subject matter experts and specialists may also be included to review proposed operations. Any operations involving extremely hazardous materials require review by the ETTP site Safe Work Planning Group.

Appendix D

PERFORMANCE METRICS

Appendix D

PERFORMANCE METRICS

D.1. GENERAL

Performance metrics are used to monitor progress toward eliminating or reducing hazards associated with potential vulnerabilities at East Tennessee Technology Park (ETTP). For example, enriched uranium deposits accumulated in enrichment process piping when the enrichment process was in production. A project has been established to remove the deposits and thus remove a vulnerability for a criticality event. A metric has been developed to track progress for the removal of these deposits.

D.2. SAMPLE METRICS

Given below is a listing of the sample metrics charts and a description of the purpose of the metric as related to vulnerabilities being addressed:

Metric	Purpose
ETTP Lithium Sales and Removal Shipment Quantity	Monitor removal of lithium being sold and shipped from the site.
Deposit Removal Project, Enriched Uranium Deposit Removal	Monitor adherence to plan for removal of enriched uranium deposits from shut down and decommissioned enrichment process piping.
Fiscal Year (FY) 1997 Cylinder Relocations	Monitor progress towards making cylinders more accessible for continued monitoring and placing them in acceptable storage facilities.
FY 1997 Quadrennial UF_6 Cylinder Inspections	Monitor completion of quadrennial (once every four years) inspections of cylinders storing depleted UF_6 for leaks, corrosion, and wall thinning damage.
FY 1997 Annual UF_6 Cylinder Inspections	Monitor completion of annual inspections of cylinders storing depleted UF_6 for leaks, corrosion, and wall thinning damage. Annual inspections are performed on cylinders that have been identified in other inspections as requiring more frequent monitoring due to observed wall thinning or abnormal corrosion.
FY 1997 Whole Body Painting	Monitor progression of painting whole cylinder bodies storing UF_6 that have experienced excessive corrosion.

Metric	Purpose
Toxic Substances Control Act Incinerator (TSCAI) Treatment Plan Status – Monthly	TSCAI burns mixed wastes to reduce vulnerabilities and reduce waste volume. The Monthly Plan Status monitors performance in meeting goals for quantities of waste burned.
Total Mixed and Total Low-Level Radioactive Waste Storage	Monitors mixed and low-level waste inventory on hand as well as receipts of wastes from other locations for storage and treatment.
Waste Treatment/Disposal Schedule Status – Mixed	Monitors performance to plan for shipping mixed wastes to off-site treatment and disposal facilities.
Waste Treatment/Disposal Schedule Status – Hazardous	Monitors performance to plan for shipping hazardous wastes to off-site treatment and disposal facilities.
Waste Treatment/Disposal Schedule Status – Low-Level Waste	Monitors performance to plan for shipping low-level wastes to off-site treatment and disposal facilities.

(9) Oak Ridge #43

Appendix E

FACILITY STATUS FOR SURVEILLANCE AND MAINTENANCE FACILITIES

S&M Program Facility Status

Building Name	Building Number	Date Built	Principal Hazardous Materials	Hazardous Materials Detail	Current Status	Deactivated Date	AIP Date
Process Building	K-25	1944	Radioactive Materials	Nuclear Criticality, Release of toxic uranium material; fissile materials, radioactive wastes, contaminated equipment and piping	Shutdown	1985	
			Toxic Materials	Release of toxic uranium material, PCBs and U in oil, floor drains, equipment; hazardous waste and asbestos			
			Asphyxiants	Liquid fluorocarbon coolants in basement; ventilation shutdown			
			Flammable Materials	Lubricating oil and ignitable waste			
			Reactive Materials	LiOH stored			
Process Building	K-27	1945	Radioactive Materials	Fissile materials, radioactive wastes, contaminated equipment and piping	Shutdown/AIP	1985	August-96
			Toxic Materials	PCBs and U in oil, floor drains, equipment; hazardous waste and asbestos			
			Asphyxiants	Liquid fluorocarbon coolants in basement; ventilation shutdown			
			Flammable Materials	Lubricating oil and ignitable waste			
			Reactive Materials	LiOH stored			
Process Building	K-29	1951	Radioactive Materials	Nuclear criticality - principal radioactive material is the slightly enriched uranyl fluoride distributed in the K-29 process equipment. Total quantity is estimated to be 4000 to 9000 kg for all three LEU process buildings (K-29, K-31 & K-33). In addition, there is an estimated 145 kg ^{99}Tc (as TcF_4) in the K-29 process equipment. Both the uranium and technicium deposits exceed the .1 Ci and 10 Ci RQ's, respectively. Some enriched uranium deposits have a potential to achieve nuclear criticality if moderated. Building and equipment surfaces are potentially contaminated. The LEU Buildings are managed as contamination areas. Specific total quantities of contamination (Ci) are not known	Shutdown	1985	
			Toxic Materials	Principal toxic material is uranyl fluoride deposits in the K-29 process equipment (see Radioactive Materials).			
Process Building	K-31	1951	Radioactive Materials	Nuclear criticality - principal radioactive material is the slightly enriched uranyl fluoride distributed in the K-31 process equipment. Total quantity is estimated to be 4000 to 9000 kg for all three LEU process buildings (K29, K31 & K-33). Less than 20,000 drums of solidified, uranium-contaminated soils in K-31. Each drum contains approximately 0.001 Ci of U contamination. The contents of approximately 100 drums exceed 0.1 Ci measure. Building and equipment surfaces are potentially contaminated. The LEU Buildings are managed as contamination areas. Specific total quantities of contamination (Ci) are not known.	Shutdown	1985	
			Toxic Materials	Principal toxic material is uranyl fluoride deposits in the K-31 process equipment (see Radioactive Materials).			

S&M Program Facility Status

Building Name	Building Number	Date Built	Principal Hazardous Materials	Hazardous Materials Detail	Current Status	Deactivated Date	AIP Date
Process Building	K-33	1954	Radioactive Materials	Nuclear criticality - principal radioactive material is the slightly enriched uranyl fluoride distributed in the K-33 process equipment. Total quantity is estimated to be 6000 to 9000 kg for all three LEU process buildings (K29, K31 & K-33). Less than 20,000 drums of solidified, uranium-contaminated soils in K-33. Each drum contains approximately 0.001 Ci of U contamination. The contents of approximately 100 drums exceed 0.1 Ci measure. Building and equipment surfaces are potentially contaminated. The LEU Buildings are managed as contamination areas. Specific total quantities of contamination (Ci) are not known.	Shutdown	1985	
			Toxic Materials	Principal toxic material is uranyl fluoride deposits in the K-31 process equipment (see Radioactive Materials). In addition, 95 drained transformers each containing approximately 145 gal of PCB oil and approximately 50 capacitors in B-25 boxes each containing 2.3 gal of PCB are stored in K-33. <10,000 drums of PCB-contaminated soils are assumed stored in K-33.			
Centrifuge Research Bldg	K-101	-	Screen Out	< RQ	AIP	1985	August-96
Feed Vaporization Bldg	K-131	-	Screen Out	< RQ	AIP	1985	August-96
Coolant Storage Area	K-300	1945	Screen Out	< RQ	AIP	1985	August-96
Coolant Unloading	K-300-C1	1945	Screen Out	< RQ	AIP	1985	August-96
Coolant Storage	K-300-C2	1945	Screen Out	< RQ	AIP	1985	August-96
Coolant Drying System	K-300-C3	1944	Screen Out	< RQ	AIP	1985	August-96
Product Withdrawal Facility	K-413	1946	Screen Out	< RQ	AIP	1985	August-96
Process Tails Withdrawal	K-631	1946	Radioactive Materials	Contains 2 1/2 ton depleted UF_6 cylinder; exceeds 302.4 RQ	AIP	1985	August-96
Test Loop Facility	K-633	1952	Screen Out	< RQ	AIP	1985	August-96
Equip. Trailer (NW of K-633)	K-633-D	1979	Screen Out	< RQ	AIP	1985	August-96
Discharge Flume & Culvert	K-701-A	-	Screen Out	< RQ	AIP	1985	August-96
Intake Tunnel	K-701-C	1944	Screen Out	< RQ	AIP	1985	August-96
K-25 Switch Yard	K-709	1951	Screen Out	< RQ	In Use	1985	
Temp Storage Tank (15,845 Gal)	K-709-B	-	Screen Out	< RQ	AIP	1985	August-96
Property Sales	K-724	1945	Screen Out	< RQ	AIP	1985	August-96
Butler Building	K-736	1945	Screen Out	< RQ	AIP	1985	August-96
K-31 Switchyard	K-762	1950	Screen Out	< RQ	AIP	1985	August-96
CRBR Sampling Storage Shed	K-766	1944	Screen Out	< RQ	AIP	1985	August-96
K-33 Switchyard	K-792	1950	Screen Out	< RQ	AIP	1985	August-96
Switchgear Room - K-1004)	K-797	1961	Screen Out	< RQ	In Use	1985	
Switchgear Room - K-1023	K-798	1971	Radioactive Materials	HP has contaminated area roped off.	Shutdown	1985	
			Toxic Materials	Batteries for switching relays.			
			Flammable Materials	Batteries for switching relays.			
			Reactive Materials	Batteries for switching relays.			
			Electrical Voltage/Current	13.8 V transformer			
K-1010 Switch Gear Room	K-799	1974	Screen Out	< RQ	AIP	1985	August-96

S&M Program Facility Status

Building Name	Building Number	Date Built	Principal Hazardous Materials	Hazardous Materials Detail	Current Status	Deactivated Date	AIP Date
Intake Water Pumphouse	K-801	1944	Screen Out	< RQ	AIP	1985	August-96
Water Treatment Facility	K-801-A	1948	Screen Out	< RQ	AIP	1985	August-96
Clariflow Tank	K-801-B	1948	Screen Out	< RQ	AIP	1985	August-96
Cooling Tower	K-832-H, excl basin	1945	Screen Out	< RQ	AIP	1985	August-96
Acid Tank	K-832-S	1940s	Screen Out	< RQ	AIP	1985	August-96
Cooling Water Return Pumphouse	K-833	1946	Screen Out	< RQ	AIP	1985	August-96
Valvehouse	K-834	1946	Screen Out	< RQ	AIP	1985	August-96
Raw Water Pop Crk Pumphouse	K-891	1954	Screen Out	< RQ	AIP	1985	August-96
Valve Vault to Clarifier Tank A	K-892-AA	1950s	Screen Out	< RQ	AIP	1985	August-96
Valve Vault to Clarifier Tank B	K-892-BB	1950s	Screen Out	< RQ	AIP	1985	August-96
Acid Containment Tank (16K gallon)	K-894-B	1950s	Screen Out	< RQ	AIP	1985	August-96
Centrifuge Spec Dev Lab&Mfr Lab	K-1004-J	1945-70	Screen Out	< RQ	Shutdown	1985	
Pilot Plant	K-1004-L	1955	Radioactive Materials Toxic Materials	Facility exceeds RQ for radionuclides. Chemicals and compounds in solid/powder, liquid and gaseous forms.	Shutdown	1985	
Cooling Tower	K-1004-N-1	1970s	Screen Out	< RQ	AIP	1985	August-96
Cooling Tower	K-1004-N-2	1970s	Screen Out	< RQ	AIP	1985	August-96
Valve House	K-1004-NV-1	1970s	Screen Out	< RQ	AIP	1985	August-96
Centrifuge Laboratory	K-1004-Q	1970	Screen Out	< RQ	Shutdown	1985	
Quality Division Office	K-1004-U		Screen Out	< RQ	In Use	1985	
Lab, Receiving & Handling	K-1010	1970	Screen Out	< RQ	Shutdown	1985	
Upper Susp Recycle/Ass Fac	K-1010-A	-	Screen Out	< RQ	Shutdown	1985	
Lab, was K1009,1050,1005	K-1023	1970	Screen Out	< RQ	In Use	1985	
Office Area	K-1024	1945	Screen Out	< RQ	In Use	1985	
Storage Area	K-1024-B	1960	Screen Out	< RQ	In Use	1985	
Equipment Storage	K-1024-C	1950s	Screen Out	< RQ	In Use	1985	
Office Area -Prefab	K-1024-D	1980s	Screen Out	< RQ	In Use	1985	
Prefab Storage Unit	K-1024-E	1980s	Screen Out	< RQ	In Use	1985	
Storage Container, N. K-1024	K-1024-F	1980s	Screen Out	< RQ	In Use	1985	
Storage Container, N. K-1024	K-1024-G	1980s	Screen Out	< RQ	In Use	1985	
Prefab Storage Unit	K-1025-E	1945	Radioactive Materials	Transferable surface contamination on floor.	AIP	1985	August-96
Storage Building	K-1031	1946	Screen Out	< RQ	AIP	1985	August-96
Waste Paint Accumulation Area	K-1031	1946	Screen Out	< RQ	Shutdown	1985	
Industrial Research Facility	K-1037	1945	Toxic Materials Electrical Voltage/Current	Open powder barrels. Several 13.8 kV transformers present.	Shutdown	1985	
Smelter House	K-1037-C	1954	Screen Out	< RQ	AIP	1985	August-96
Maintenance Shop, K-633	K-1040	1945	Screen Out	< RQ	AIP	1985	August-96
Valve Certification Lab	K-1045	1944	Screen Out	< RQ	In Use	1985	
Advanced Machine Dev Lab	K-1052	1974	Screen Out	< RQ	Shutdown	1985	
K-101 Storage Pad	K-1066-N	-	Screen Out	< RQ	Shutdown	1985	
Horton Sphere	K-1103	1954	Screen Out	< RQ	Shutdown	1985	
Feed and Tails Building	K-1131	1945	Radioactive Materials	UF6 in 10-ton test weight cylinder. Material exceeds 302.4 RQ but less than Category 3 per 1027-92.	AIP	1985	August-96

S&M Program Facility Status

Building Name	Building Number	Date Built	Principal Hazardous Materials	Hazardous Materials Detail	Current Status	Deactivated Date	AIP Date
			Toxic Materials	UF6 in 10-ton test weight cylinder. Quantity of HF and soluble uranium deposition in facility are above RQ; residual fluorides exist in equipment/piping, selenium, nickel cadmium in D.C. electrical equipment, and cobaltic fluoride in transuranic traps.			
Gas (Tank) Holder	K-1131-B	1945	Screen Out	< RQ	AIP	1985	August-96
Sprinkler Valve House	K-1131-C	1945	Screen Out	< RQ	AIP	1985	August-96
Sprinkler Valve House	K-1131-D	1945	Screen Out	< RQ	AIP	1985	August-96
HF Storage Tank Shed	K-1132	1953	Screen Out	< RQ	AIP	1985	August-96
HF Storage Tank Shed	K-1133	1953	Screen Out	< RQ	AIP	1985	August-96
HF Storage Tank (buried)	K-1134-A	1953	Screen Out	< RQ	AIP	1985	August-96
HF Storage Tank	K-1134-B	1953	Screen Out	< RQ	AIP	1985	August-96
HF Storage Control Room	K-1135	1951	Screen Out	< RQ	AIP	1985	August-96
All South Bay	K-1200 S Bay	1974	Screen Out	< RQ	Shutdown	1985	
Condensate Station	K-1205-G Outside 1231	1945	Screen Out	< RQ	AIP	1985	August-96
Condensate Station	K-1205-J Inside 1131	1945	Screen Out	< RQ	AIP	1985	August-96
Centrifuge Test Facility (CTF)	K-1210	1975	Screen Out	< RQ	Shutdown	1985	
Process Area	K-1210-A	1978	Screen Out	< RQ	Shutdown	1985	
Advanced Equip. Test Facility	K-1210-A Office Area	1978	Screen Out	< RQ	Shutdown	1985	
Office Area	K-1210-B	1978	Screen Out	< RQ	Shutdown	1985	
CTF Storage	K-1211	1978	Screen Out	< RQ	AIP	1985	August-96
Centrifuge Plant Demon Fac	K-1220 Center Bay	1978	Screen Out	< RQ	In Use	1985	
Centrifuge Plant Demon Fac	K-1220 North Bay	1978	Screen Out	< RQ	Shutdown	1985	
Process Building	K-1231	1945	Screen Out	< RQ	AIP	1985	August-96
Propane Storage Facility	K-1231-A	1953	Screen Out	< RQ	AIP	1985	August-96
Caustic Storage Tank	K-1231-B	1953	Screen Out	< RQ	AIP	1985	August-96
Collection Facility	K-1233	1976	Screen Out	< RQ	AIP	1985	August-96
Drum Cleaning Facility	K-1233-A	1953	Screen Out	< RQ	AIP	1985	August-96
Propane Storage Tank	K-1234	1976	Screen Out	< RQ	AIP	1985	August-96
Valve House on 10" F.W.	K-1234-A	1976	Screen Out	< RQ	AIP	1985	August-96
Barge Loading Facility	K-1251 - Dismantled	-	Screen Out	< RQ	R	1985	
Brick Vent Stack	K-1300	1944	Radioactive Materials Toxic Materials	Uranium compound deposits in stack, ducts, and fan. Bounding estimates are 2,600 G U235, 122 KG total U Uranium compounds	AIP	1985	August-96
Pump Storage Building	K-1301	1944	Screen Out	< RQ	AIP	1985	August-96
Fluorine Storage	K-1302 Cells A,B,D	1944	Screen Out	< RQ	AIP	1985	August-96
Research Compressor Bldg	K-1303	1945	Screen Out	< RQ	AIP	1985	August-96
Storage Building	K-1310-CH	1980s	Screen Out	< RQ	Shutdown	1985	
Boundary Control Station #76	K-1310-CJ	1980s	Screen Out	< RQ	Shutdown	1985	
Converter Re-tubing Area	K-1401-N	1944	Screen Out	< RQ	Shutdown/AIP	1985	
Basement	K-1401-NB	1944	Radioactive Materials	Uranium residues exceed 302.4 RQ	Shutdown	1985	
Acid Storage Building	K-1404	1944	Screen Out	< RQ	AIP	1985	August-96
Acid Storage Tank	K-1404-A	1944	Screen Out	< RQ	AIP	1985	August-96

S&M Program Facility Status

Building Name	Building Number	Date Built	Principal Hazardous Materials	Hazardous Materials Detail	Current Status	Deactivated Date	AIP Date
Degreaser Solvent Storage Tank	K-1404-B	1944	Screen Out	<RQ	AIP	1985	August-96
High Temperature Laboratory	K-1405	1944	Screen Out	<RQ	Shutdown	1985	
Maintenance Facility	K-1407	1944	Screen Out	<RQ	Shutdown	1985	
Pyrofax Heating Unit	K-1408-A	1944	Screen Out	<RQ	AIP	1985	August-96
Nickel; Plating Facility	K-1410	1945	Radioactive Materials	Maximum bounding radionuclide inventory from radioactive contamination is << RQ. NDA survey indicates no measurable U deposits are present.	AIP	1985	August-96
			Toxic Materials	Nickel plating residues present. Ground potentially contaminated with electroplating residues, degreasing, and uranium decontam. residues and PCBs.			
			Carcinogen	Nickel compound residues.			
			Biohazard	Bird droppings.			
Engineering Laboratory	K-1413	1952	Screen Out	<RQ	AIP	1985	August-96
Loading Station and Pit	K-1413-C	1952	Screen Out	<RQ	AIP	1985	August-96
Pond Waste RCRA Storage	K-1417-B	1990s	Screen Out	<RQ	RCRA	1985	
Decontam & Uranium Recovery	K-1420	1954	Radioactive Materials	Nuclear criticality - radiological materials exceed 302.4 RQ	Shutdown	1985	
			Toxic Materials	Toxic materials exceed 302.4 RQ			
			Reactive Materials	Reactive materials exceed 302.4 RQ			
Flammable Liquid Storage	K-1420-B	1976	Screen Out	<RQ	Shutdown	1985	
Gas Cylinder Storage	K-1420-C	1953	Screen Out	<RQ	Shutdown	1985	
Incinerator Area	K-1421	1954	Screen Out	<RQ	AIP	1985	August-96
Storage Building	K-1422	1953	Screen Out	<RQ	AIP	1985	August-96
Coal Conveyor System	K-1501-E	1979	Screen Out	<RQ	Shutdown	1985	
Technology Test Facility	K-1600	1972	Screen Out	<RQ	InUse	1985	
Annex of K-1600	K-1600-A	1972	Screen Out	<RQ	Shutdown	1985	
Personnel Monitoring Station	K-1704-1	1989	Screen Out	<RQ	InUse	1985	
Personnel Monitoring Station	K-1704-2	1988	Screen Out	<RQ	InUse	1985	
	Tie Lines						
Tie Lines	33 to 31	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	31 to 631	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	631 to 27	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	27 to 633	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	27 to 1231	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	27 to 1131	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	27 to 29	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	29 to 413	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	29 to 311-1	1950s	Screen Out	<RQ	AIP	1985	August-96
Tie Lines	29 to 312	1950s	Screen Out	<RQ	AIP	1985	August-96

Appendix F

ASSESSMENT PLAN FOR WASTE MANAGEMENT STORAGE FACILITIES

Appendix F

ASSESSMENT PLAN FOR WASTE MANAGEMENT STORAGE FACILITIES

Waste Management personnel are assessing current waste inventory management practices to determine the potential for conditions that pose a credible risk of fire, explosion, or over pressurization, resulting in personnel injury or release of toxic materials. The following plan is used to assess waste management storage facilities.

1. Assess all site waste streams individually to establish material risk categories and group according to 40 CFR Part 265 Appendix 5. (Examples of potentially incompatible waste.)

2. Assess current storage configuration according to guidelines in 40 CFR 264, Appendix V, and Y-12 document Y/AD-637 for proper segregation of incompatible materials. (Proper segregation is defined as there existing no credible scenario for mixing of materials during routine storage operations.)

    2a. Obtain KWTARS printout of all risk area waste categories according to site waste stream and waste identification numbers to identify storage locations.

    2b. Review data to determine potential compatibility issues based on storage location and configuration, and identify areas for field confirmation.

    2c. Conduct field confirmation to document improper segregation. Take corrective action if improper segregation of waste materials are confirmed.

3. Develop plan to assess container configuration, integrity, condition, and compatibility for each waste risk category.

    3a. Acids

        1. Evaluate lessons learned associated with Paducah acid drum over pressurization (97) and K-25 acid drum over pressurization (91) to determine current vulnerability.

        2. Identify current acid waste inventory at ETTP through query of K-25 Waste Tracking and Reporting System (KWTARS).

        3. Walkdown all waste acid storage areas to inspect drums for over pressurization. If bulging drums are found, take corrective action in accordance with WTSO-2000/2002.

4. Determine number of overpacked acid containers.

5. Transfer acid from overpacked drums to appropriate containers.

6. Evaluate current acid inventory types, concentrations, container types, and date to storage for potential accelerated corrosion rates that could result in over pressurization. Install pressure-relief devices in known and suspect concentrated acids.

7. Revise ETTP waste acceptance criteria to prohibit the acceptance of overpacked corrosive wastes.

8. Review site treatment plan priorities and accelerate the schedule for treatment of concentrated acids.

3b. Peroxides/Oxidizers/Shock Sensitive Wastes

1. Identify current inventory of peroxides/oxidizers/shock sensitive wastes at ETTP through query of KWTARS.

2. Evaluate condition of existing containers through inspection of storage areas.

3. Inspect peroxides and perchloric acids for evidence of crystalline solids or layers.

   Notify Park Shift Superintendent to convene the hazardous material disposal committee if crystalline solids are encountered.

3c. Flammable Wastes

1. Identify current inventory of flammable wastes at ETTP through query of KWTARS.

2. Confirm that flammable wastes are stored in accordance with National Fire Protection Association and facility auditable safety analysis.

3. Correct any storage deficiencies found.

3d. Organics/Organic Laden Wastewater Treatment Residues

1. Identify current inventory of organics through inspection of storage areas with emphasis on over pressurization.

2. Evaluate existing container condition through inspection of storage areas, with emphasis on over pressurization.

3. Install pressure-relief devices as required.

3e. Compressed Gases/Aerosols

1. Inspect compressed gas cylinders stored in Building K-1302 to ensure cylinders are properly secured.

2. Evaluate treatment or recontainerization of remaining legacy cylinders at the transportable gas processing unit.

3. Segregate and puncture aerosol cans as generated and manage carcasses as sanitary waste.

3f. Base Wastes

1. Identify current base waste inventory at ETTP through query of KWTARS.

2. Walkdown all base waste storage areas to inspect drums for corrosion induced leakage. If leaking drums are encountered, cleanup any spilled material and transfer contents to poly-lined containers.

3. Determine number of base waste carbon steel drums.

4. Transfer base wastes from carbon steel drums to poly-lined drums for waste drums not scheduled for treatment in fiscal year 1998.

3g. Water Reactive Wastes

1. Identify current water reactive wastes inventory at ETTP through query of KWTARS.

2. Evaluate existing container condition through inspection of storage areas.

3. Ensure storage areas do not contain active sprinkler systems.

3h. Spent Cyanide/Sulfide Wastes

1. Identify current cyanide/sulfide wastes inventory at ETTP through query of KWTARS.

2. Evaluate existing container condition through inspection of storage areas.

4. Legacy Waste Sampling

1. Sample all containers of legacy waste. The Mixed Waste Characterization Program is currently tasked to perform this action.

K/EM-557
Nov 14th report
already received

Appendix G

STATUS OF KNOWN VULNERABILITIES

Refer to VUL. Report